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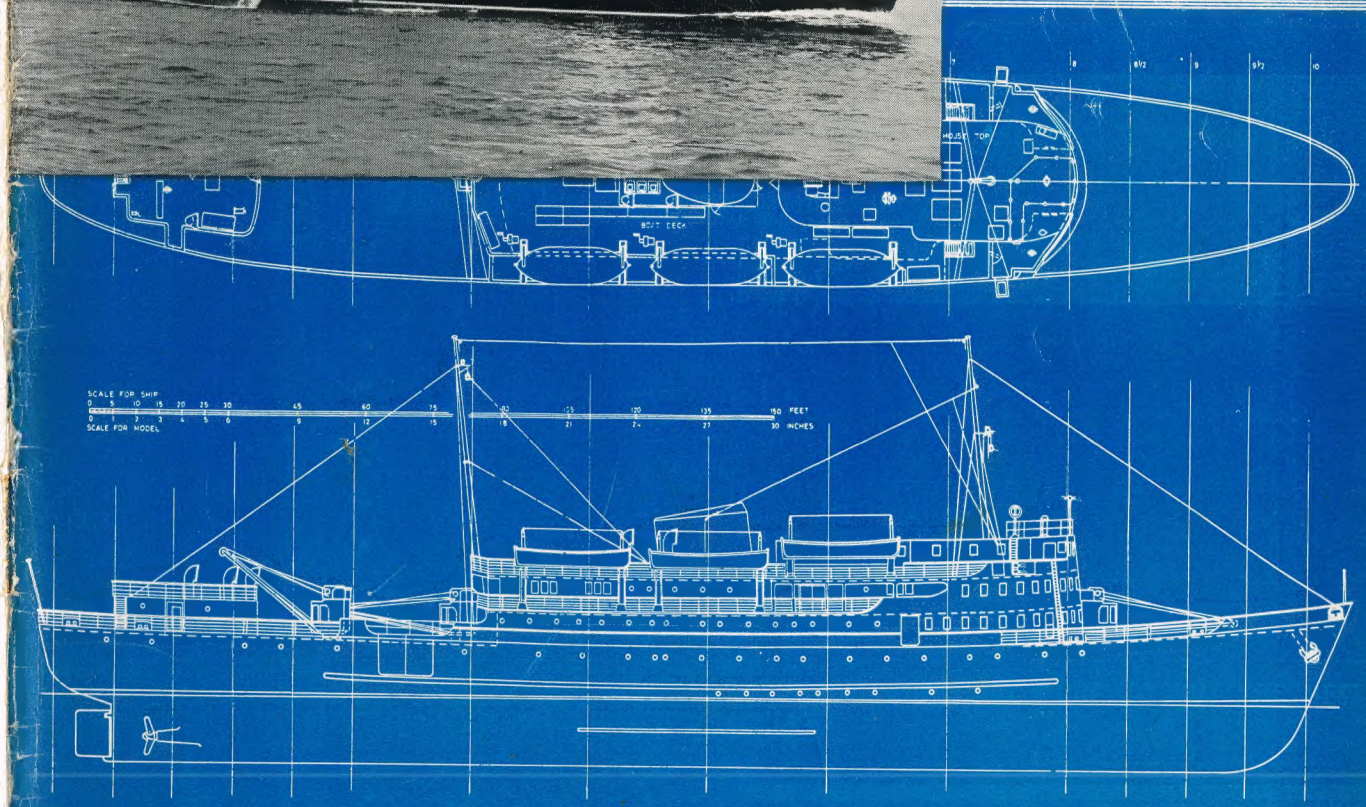

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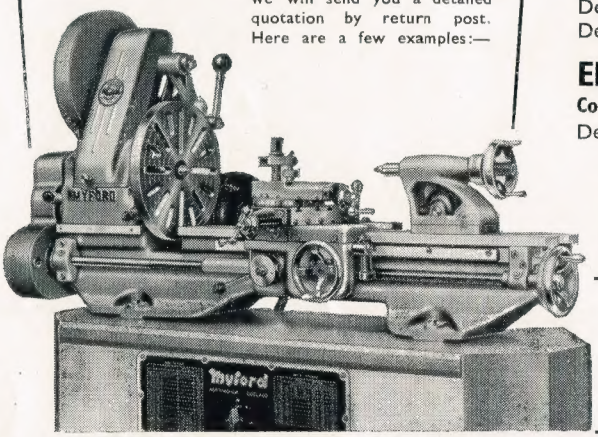

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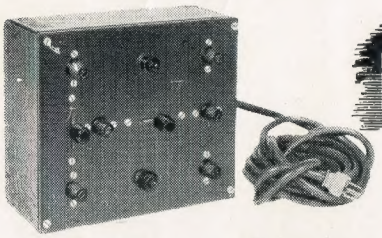

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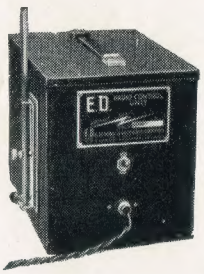

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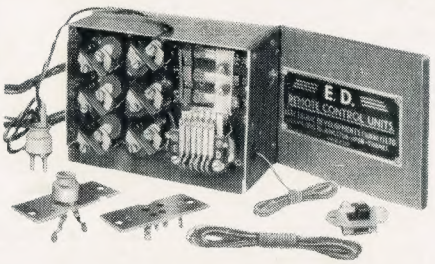

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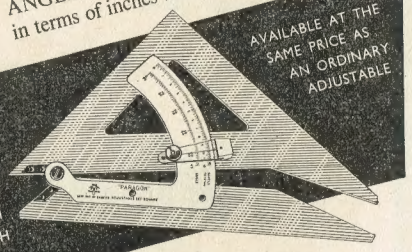

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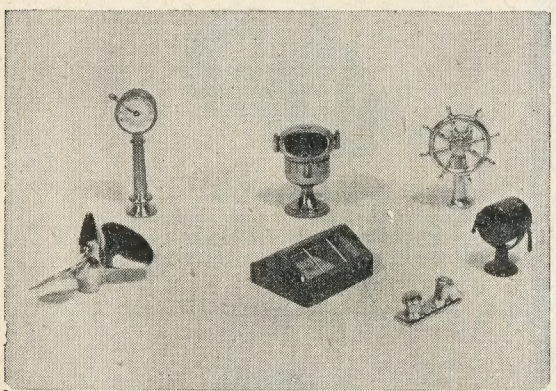

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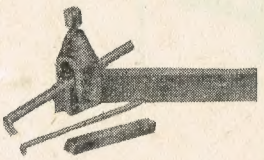

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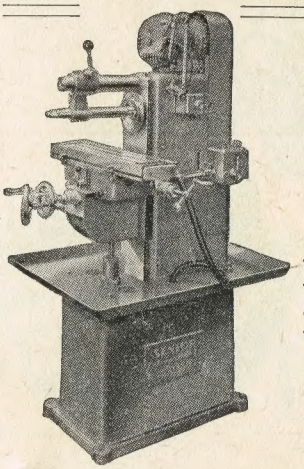

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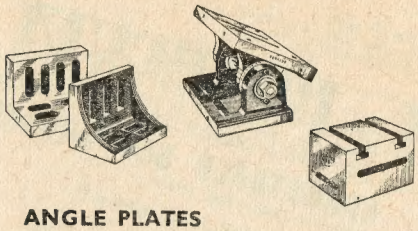

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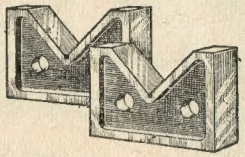

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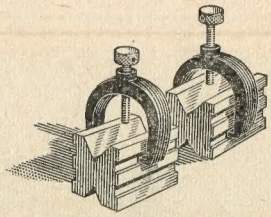

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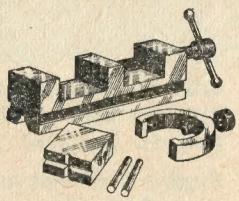

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7 FEBRUARY 1957 VOLUME 116 No 2907

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NEXT WEEK

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50 years ago
M.E. musical clock

All correspondence should be addressed to the Editor, Model Engineer, 19-20 Noel Street, London, W.1.

SMOKE RINGS

A WEEKLY COMMENTARY BY VULCAN

THE large overseas readership of MODEL ENGINEER is a source of great satisfaction to all of us, but it does bring some problems. One recurring difficulty is when overseas readers wish to buy new or secondhand equipment in Britain.

First, they write to us asking for assistance in buying the equipment: that part is reasonably easy. If they want new equipment we put them in touch with manufacturers and, where we have made tests in our own workshop, we give an opinion on its efficiency. If the search is for models or secondhand goods we insert a small advertisement on their behalf and that generally achieves the desired effect.

But it is when they ask us to advise them and to inspect equipment that we are in a cleft stick.

Staff limitations

The staff of MODEL ENGINEER is simply not large enough to maintain a buying and selling department for anything other than back copies of the magazine. It is not possible to buy models for readers or to advise on their value. For one thing, valuations are largely a matter of opinion and it is feasible to have widely differing opinions on the condition of a particular model.

I was talking over the problem this week with E. T. Westbury, who has been asked many times to carry out such functions. Sometimes he has done so—but in many cases he has failed to please the purchaser and this has left him determined not to do so again.

The latest request is from a South African reader who wants to buy a 3½ in. gauge *Juliet* or *Tich*. He says that he is prepared to pay the travelling expenses of anybody willing to bring the locomotive to our offices and to pay for its shipment to South Africa.

I have had to reply that, much as we would like to help, it is not possible, but I should like to think of some solution which would be of assistance to him.

Perhaps this is something in which the Society of Model and Experimental Engineers could help. If they laid down the conditions under which they would carry out such services to members only it might result in an increase in overseas membership.

Not what she seems ?

IT is somewhat disturbing to note that, very occasionally, some museum exhibit is either incorrectly or, at least, doubtfully described. One instance of this is the old four-wheel electric locomotive that claims to be No 1 of the former City and South London Railway and now an exhibit in the Science Museum, South Kensington.

A letter and photograph from T. S. Lascelles, and raising considerable doubt as to the claims of this machine, were published in a recent issue of

SMOKE RINGS . . .

The Railway Gazette. The photograph shows three of the original C. and S.L.R. locomotives, including No 1 which not only differs from the other two, but also from the one now at South Kensington.

Mr Lascelles states: " The machine preserved at South Kensington is exactly like the two others seen in the photograph and cannot be the original No 1."

Questions that arise

J. N. Maskelyne has looked into this matter and confirms that Mr Lascelles is right. This being so, one or two important questions arise: (1) On whose authority is the engine described as No 1 ? Is it the original No 1 ? If so, was it ever rebuilt to conform with the later engines ?—a very unlikely suggestion. Was the *original* No 1 broken up at some time and replaced by a later engine given the same number ? There does not seem to be any record of this having been done; but it is a possibility.

A rather significant point is that the Science Museum engine carries no numberplate or any other evidence of its origin, and this merely deepens the mystery. Has any reader any information on the matter ?

Ancient Oracles

ON looking through some text-books on engineering practice published about a hundred years ago, I was inclined to wonder whether the present-day technical literature will look as archaic to 21st-century readers as these old books do to us. Much of the advice given in them, however, is just as sound as ever, at least in respect of basic principles, though the ponderous way in which it was presented would not suit the modern reader.

In general, both the number and quality of the illustrations was inadequate, though there were notable exceptions, and one cannot but admire the painstaking care and skill of the workers who produced the fine line engravings and woodcuts long before the days of photo-engraving. A great deal of modern draughtsmanship appears crude in comparison with the best examples of plates found in these old books, where technical inaccuracy was rarely condoned on the grounds of " artistic licence."

These ancient volumes still hold much of value to the most up-to-date engineering student, as they not only deal with fundamental principles as immutable as the laws of Nature, but also show how the far-sighted pioneers of the engineering industry wrestled with and overcame problems as formidable as any which are faced by their present-day descendants.

I wonder whether posterity will be able to say the same for the technical literature of today ?

Dealing with queries

QUESTIONS which crop up from time to time convince me that many readers misunderstand one important point about the MODEL ENGINEER Query service; it is that replies printed in the journal are extracts from fuller letters sent through the post.

While on the subject of queries, the volume which have to be dealt with grows larger every week. Questions on a wide variety of subjects arrive in considerable numbers from all parts of the world. They are answered with good humour and great skill, in my opinion. It is, however, an opinion which I will not pretend is unbiased.

It is important, however, that query coupons should be included with all letters and that, to accompany letters which require an answer, stamped addressed envelopes are also enclosed.

Service to readers

Another department which is kept busy these days and which copes with some odd requests is the M.E. plans service. It is provided as a service to readers as, despite the fact that quite high prices have to be charged for some plans, it is not a commercial proposition.

I am told that at the moment there is a lively demand for the sheets of the Sixth Rate which F. J. Collins described in *Ships and Ship Models* last year.

There was considerable demand from all over the world for drawings of the triple expansion marine engine which appeared on the MODEL ENGINEER cover recently, while there is a steady sale for E. T. Westbury's drawings of a simple steam-engine

This is particularly suitable for construction in school workshops and I am hoping it will come to the ears of metalwork teachers, who are always looking for tasks for their pupils which will hold their interest.

Cover picture

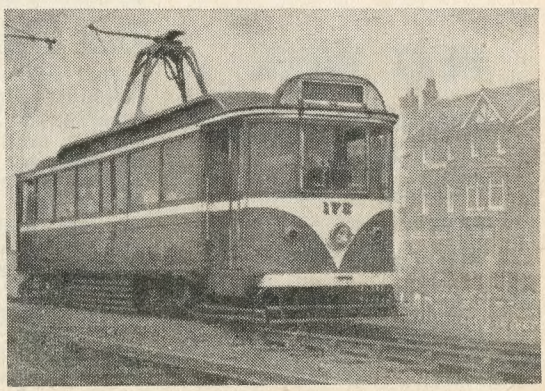
St Ninian is a packet steamer plying in Scottish waters. Details of the construction of a model of this attractive ship are being serialised in MODEL ENGINEER; *this week's instalment begins on page* 201. *The first sheet (hull side view and deck plans) of the working drawings for St Ninian is now available, price* 4*s.* 6*d., from Percival Marshall and Co. Ltd,* 19-20, *Noel Street, London, W.*1. *Ask for P.B.*20, *sheet No* 1.

Heavy parcels traffic

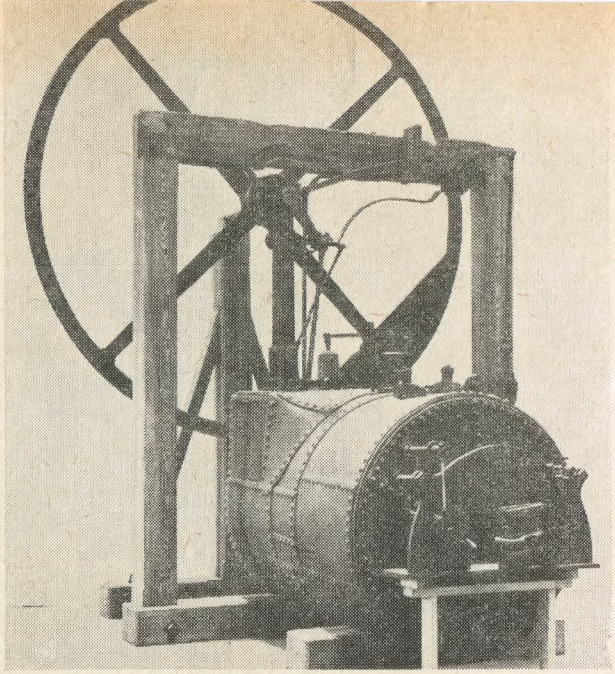
THE observer of railway traffic can scarcely fail to notice that the rationing of petrol has had the result of increasing the loads of certain kinds of railway freight trains. Perishable goods travelling long distances have increased the average number of vehicles in these trains; but it is the parcels train that seems to be most affected.

A very striking instance of this was noted recently at Carlisle when the normally heavy night parcels train from Willesden Junction, due at 10.55 a.m. was seen to arrive at 2.3 p.m. It was hauled by Class 5 4-6-0 engine No 45250 piloting a Class 7P 4-6-0 No 45502, *Royal Naval Division*, and the load was 16 8-wheelers, one 6-wheeler and 13 4-wheelers.

Trains of 26 vehicles, other than loose-coupled or braked freight trains of ordinary wagons, are rare indeed !



A Dick Kerr veteran tram of 1928 *owned by Blackpool Corporation. Originally this car was fitted with a pantograph*



Trevithick engines in South America

By J. F. Wellington

Trevithick's high-pressure steam engine which he built in 1811 *for Sir Christopher Hawkins, of Trewithin, Cornwall* (*Crown copyright, Science Museum, London*)

RICHARD TREVITHICK, being a man of action and spontaneous of habit, has left us less in the way of detailed description and drawings of his many inventions than would have been the case had he been of a more methodical nature. Many were lost or destroyed throughout the period of his turbulent life.

It is known that his letters were extensive and covered many subjects in connection with his activities as a pioneer in the engineering field. It is mainly through the rough draft copies of these that the little-known information of his South American engines is made available.

The mines for which these engines were especially designed were situated at extremely high altitudes in the Cordillera mountains of Peru, to which the only means of access was by steep and winding mountain tracks and over which equipment or stores had to be carried on the backs of mules. The difficulty therefore in designing a suitable type of engine and its subsequent conveyance up the mountains presented a problem which more than one prominent engineer of the period had considered impossible.

Some details of the engines and an account of this hazardous enterprise are available to us today through a description of the life of Richard Trevithick written many years afterwards in 1872 by his son Francis Trevithick, in which many letters and drafts are quoted. It is mainly through his correspondence with Messrs Hazeldine and Rastrick, iron founders of Bridgenorth who made most of the castings for the engines, and to his descriptions of other work in hand for the mines, that these details are given.

Richard Trevithick was the pioneer of the use of high-pressure steam, which James Watt would not in any circumstances condone. It is said that the illustrious Watt was approached on the subject of sending engines to South America but turned the matter down as impracticable if not impossible, as no doubt his engines would have been, owing to their great power to weight ratio, low pressure, and poor operating qualities at those great altitudes.

It was through Trevithick's earlier work in this field that he was able to provide engines of sufficient power and compactness, to permit their carriage in separate parts by mules over the precipitous passes to the mines, which were flooded and abandoned at this time through lack of any means to pump them.

The story goes, that in 1811 Don Francisco Uville journeyed to England in search of suitable steam engines, but had been sadly discouraged. Having purchased in London a model of a new and unusual type of engine, he returned with it to Peru and tested it in the rarefied mountain atmosphere with success.

Subsequently he returned to England in 1813 to search for the inventor, Richard Trevithick. With his usual confidence Trevithick designed the engines and pumps. An agreement was made with Uville, who represented the Spanish adventurers, and arrangements made for the supply of machinery within a period of four months.

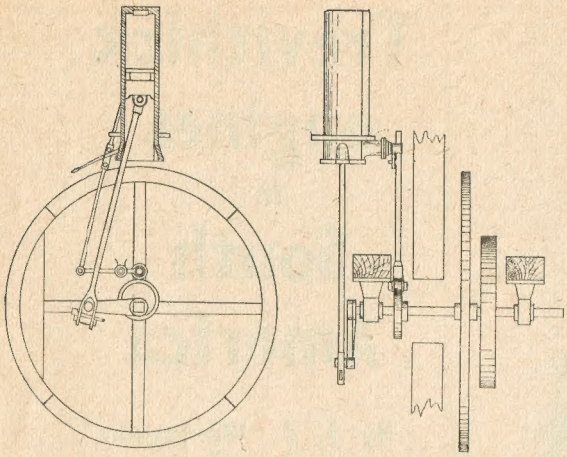
WINDING ENGINES

These early engines followed somewhat in a larger scale the single-acting threshing engines which were already being manufactured for Trevithick and which in their turn were evolved from the original patent of 1802. In Figs 1 and 2 is shown the modified arrangement of a steam whim for the Santa Rosa mine. These machines were evidently designed either for winding or ore crushing purposes.

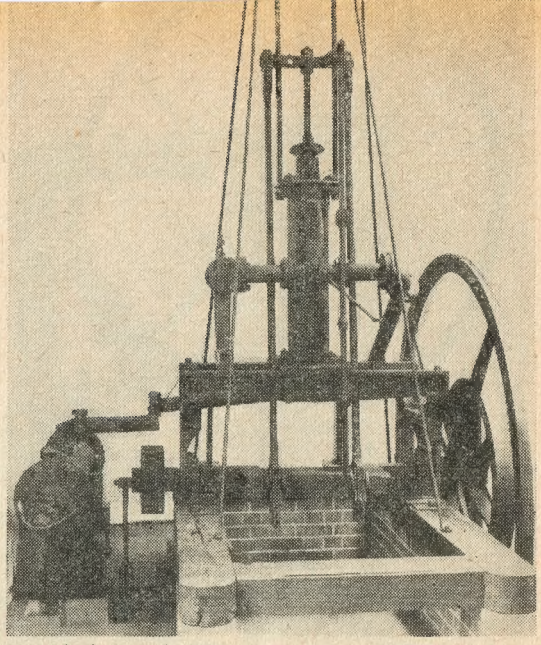
Trevithick, in a letter dated 11 October 1813, hastily modified the arrangement of these engines with a crank working on a pin fixed to an indoor flywheel, and suggested that the flywheel should be moved to the outside of the house and a crank arm placed on the end of the driving shaft to allow the engineman greater access to the valve gear, in this case a four-way cock worked by an eccentric on the crankshaft.

These engines are described as high-pressure steam "puffer" engines of 8 h.p. with open-top cylinders of 12 in. dia., 3 ft 6 in. stroke. Steam at a pressure of 30 p.s.i. was admitted to the cylinder under the piston by the four-way cock, the gradual closing of which similarly reduced the supply of steam when about one-third of the stroke had been made. Complete cut-off took place sometime before completion of the stroke. The cock then ejected the steam from under the piston into the chimney blastpipe.

The down stroke was performed by the weight of the descending piston, made fairly deep and heavy, and by the momentum of the large flywheel and balance weight. The speed was about 30 strokes a min.



Figs 1, *and* 2: *General arrangement of Trevithick's winding engine used in the South American mines,* 1813



Trevithick-type high-pressure engine with feed heater
(Crown copyright, Science Museum, London)

The general arrangement of these engines is taken from a rough hand sketch by Trevithick in one of his letters. Very little actual detail is known; it has therefore been necessary to surmise this to some extent.

The boilers were the usual Trevithick wrought-iron cylindrical type with internal flue and fireplace. These boilers may have been the early Cornish pattern invented by Trevithick in 1811, which superseded his return-flue boilers as fitted to the earlier engines.

Francis Trevithick says that the cylinders for the winding engines were probably fixed in the boilers, but it is more likely they were independent as the stroke of the long cylinder would certainly impede the fixture of the long, large diameter centre flue so typical of Cornish boilers; although this may have been overcome by the addition of a separate receptacle for the cylinder fitted to and in communication with the boiler.

Incidentally it is possible to work the single-acting engine with a three-way cock. These probably were fitted, but with the exception of one or two references it is known as a four-way, possibly to avoid confusion.

PUMPING ENGINES

The first six pumping engines are described in Richard Trevithick's letter to the Neath Abbey Iron Works on 22 May 1813, part of which is as follows:

"I have engaged to get six engines with pitwork, etc., to send abroad. A great part of the iron work and the boilers I have arranged for in Cornwall. These engines will be high pressure engines, because the place they are for has a very deep adit driven into the mountain; and lifting condensing water to the surface would be a greater load than the whole of the work under the adit level.

"I call a set of work, a 24 inch single engine, 6 feet stroke, piston, cylinder bottom, single nozzle with two 5 inch valves, and perpendicular pipe, no cylinder top, the piston rod not to be turned, 3 inch safety valve, fire door, two small 'Y' shafts and gear handles etc; a good strong winch set in a broadish frame. . . . 25 fathoms of 12 inch pumps, a 12 inch plunger, an 11 inch working barrel, clack seat and wind-bore, with brass boshes, and clacks, a force pump for the boiler, and 10 fathoms of 3 inch pipes to carry water to and from the engines. I have engaged to supply six full sets of the above mentioned material."

In a letter to Hazeldine and Rastrick he says: ". . . where these engines are to be conveyed it being impossible to carry above 5 cwt. in one piece." This at the request of Francis Uville, the mining agent. was subsequently reduced to 300 lb. to make easier loading for the mules.

It was at this time that a sugar rolling mill engine intended for the West Indies was redirected to be sent to the mine at Lima.

The pumping engines, obviously of the non-rotative type, are described by Francis Trevithick as high-pressure "puffer" engines with open top cylinders 24 in. in dia., 6 ft stroke, with a crosshead working in guides and side rods connecting to the pump rods. Two valves turned the steam on and off under the piston with ordinary gear and handles.

The boilers were similar to those for the whim engines, but had not the cylinders fixed in them. A balance beam regulated the movement.

The sketch of a pumping engine accompanying this article gives an idea of the arrangement for a direct-acting, open-top-cylinder, non-rotative, single-acting engine with the cylinder placed over the shaft. This is a very probable set-up as Trevithick had used this method when erecting his famous Wheal Prosper and Herland mine plunger pole engines.

The open-top cylinder was supported directly over the mine shaft by massive timber joists, the piston rod being connected by means of a crosshead and side rods to the pump rod underneath. Two valves of the mushroom single-beat type controlled the admission and eduction of steam. These were situated at the bottom of the cylinder in a single nozzle, the valve operating gearwork being erected on an adjacent frame.

A large wooden balance bob pivoted on two trunnions with a balance box at its outer end was connected at its inner end by links to the suspended pump rod. A "plug" rod working in guides for operating the gearwork, obtained its movement from the balance beam, as also did the feed and other auxiliary pumps.

Although some little doubt exists regarding the type of pumps in the shafts these appear to be of the plunger pole type as Trevithick mentions the need of a 12 in. plunger in a letter to Pengilly of Neath Abbey, and again to Hazeldine and Rastrick he mentions four plunger pistons 11 in. dia. to suit 11 in. working barrels, provided it or they should be used for the purpose of a plunger.

Evidently it was a piston-type plunger pump as the working stroke was comparatively short. This would

be in opposition to the more common pole or ram working through a gland in a plain cast barrel as used in Cornwall at this time.

In any case, the plunger pole pump was adopted and developed by Richard Trevithick and other Cornishmen many years before and used by them exclusively, so bucket lifts were most unlikely.

Francis Trevithick quotes a miner who returned from the Yauricocha mine in 1872 as saying that he saw two of Trevithick's engines at work, one of them a horizontal 12 in. open-top-cylinder pumping engine of about 4 ft stroke, having two flywheels about 10 ft dia. with a cog wheel 7 ft dia. working a 10 in. pump bucket. This engine no doubt was an exception and could possibly have been a converted winding engine as the cylinder diameter and length of stroke corresponds with the latter.

Returning to the pumping engines, the action of the engine is as follows. In the sketch of engine (Fig. 3) steam is admitted to the cylinder by admission valve, *D*, the piston rod, *A*, rising under pressure, raises the pump rods in the shaft, allowing the pumps to fill with water.

The plug rod, *F*, closes the admission valve at a predetermined part of the stroke, and completion takes place under expansion. At the extremity of piston travel, the plug rod opens the eduction valve, *C*, allowing the escape of steam now at low pressure to the atmosphere. The pump rods, together with the piston, now descend under their own weight and force the column of water in the pumps to the surface.

The balance box, *L*, and beam, *I*, provide the required state of equilibrium. The box is filled with movable ballast such as loose stones. The side rods and guides are shown at *E*, the crosshead under the cylinder at *J*, the pump rods at *K* and the rising main at *N*. *G* and *H* are handles operating the valves and are moved by the plug rod, except when starting the engine when they are hand operated. *M* is a connection for working feed or auxiliary pumps.

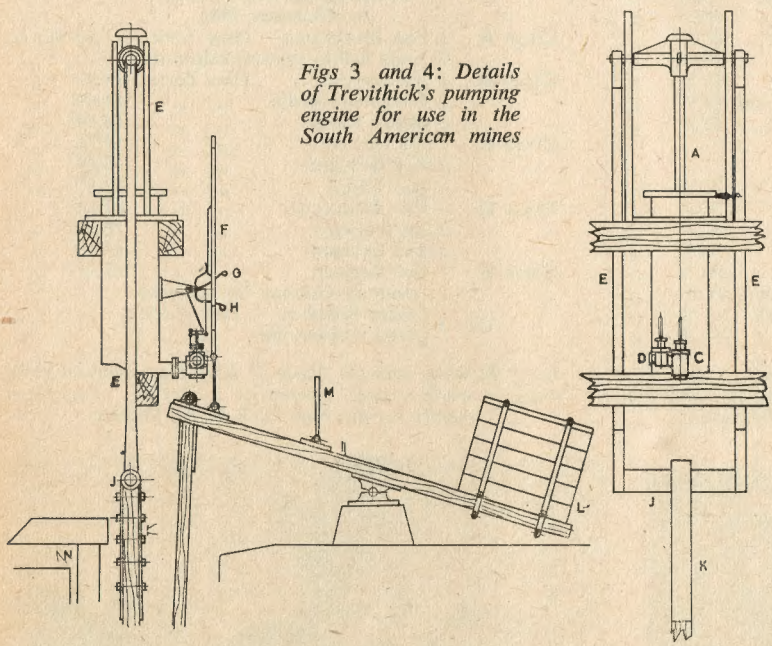
After much delay, mainly through financial reasons, nine engines were despatched to South America on 1 September 1814 with three Cornishmen in attendance as mechanic and pitmen. A summary of the detailed invoice reads as follows:

"Invoice of four steam engines, and four winding engines, one portable rolling engine, and materials for ditto, two crushing mills, four extra patent boilers, spare materials for engines, boring rods, miners', blacksmiths', and carpenters' tools etc."

These details themselves give us an idea of the primitive conditions to which this machinery was consigned, and the necessity to provide everything required in the way of equipment. Some idea of the difficulties which arose can be given as it is stated that the first steam engine was set to work in the Santa Rosa mine on 27 July 1816, to be followed within six months by another pumping engine in the Yauricocha mine. One or two winding engines were also set to work during this period, nearly two years after their departure from England.

It is extremely difficult to assume the actual set-up of the engines and pitwork in mines of this type. Being comparatively small workings and situated in a very mountainous district, they were no doubt mostly entered through deep adits in the sides of the mountains, although perpendicular shafts are in evidence especially at Cerro De Pasco, and it was from these that the engines raised the ores to surface and the water to adit level.

These engines, being more or less compact, were fixed in many odd situations and worked the pumps in the shafts by means of flat levers and bell cranks assisted by balance boxes, as well as by the more usual method from directly over the shafts. The arrangement of the steam whims or winding engines would be simpler.



Figs 3 *and* 4: *Details of Trevithick's pumping engine for use in the South American mines*

Failure of a mission

The subsequent arrival of Don Ricardo Trevithic, as he was called by the Spaniards, the troubles and misfortunes which beset him as supervisor through lack of skilled labour, the petty jealousies of the Spanish adventurers, and the ultimate ruin of the mining venture through civil war is another story. Trevithick returned to England practically penniless.

Regarding the model, it is extremely doubtful whether it is still in existence or if any record of its whereabouts after Uville took it to South America remains. It was probably very similar to the South Kensington model except that it may not have been a "travelling engine," as Trevithick aptly called his locomotives.

Francis Trevithick, in a reference to his mother, says that she frequently spoke of models of her husband's early engines, the first of which worked at her house in Camborne about the year 1796 or 1797.

Shortly afterwards another model was made, which ran around the room with a block of previously heated red-hot iron in the fire tube. A third model was heated by a spirit lamp, this one being taken to London by an unnamed gentleman. This could possibly have been the model which found its way to South America.

As a sequel, it is interesting to note that Messrs Harvey of Hayle were supplying the reopened mines in the year 1871 with four 37 in. steam pumping engines and six boilers. Since no single piece of this machinery had to weigh more than 300 lb., each cylinder was made in 37 different pieces ! ▣

NEW WORLD RECORDS for Model power boats

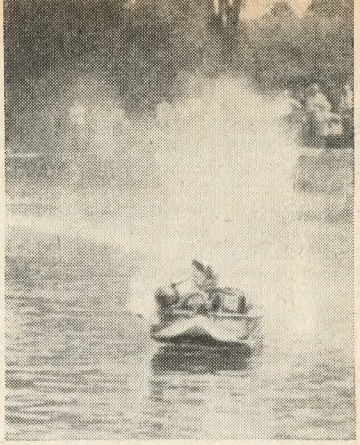
By Bob Graham

By a strange coincidence the world record for Class C and Class E model power boats now stands at precisely the same figure, even to the second decimal place—85.71 m.p.h.

Max Biederman, of New York, scored a world record for Class A (over 30 c.c.) when he reached 71.48 m.p.h. at Baltimore on June 17. At the Toronto International Regatta on August 25 and 26 he raised the record four times in succession with speeds of 72, 72.58, 75 and 78.26 m.p.h.

Then in Class C (15 c.c.) Biederman claimed another world record, again at Baltimore on June 17, with 82.56 m.p.h. and finally at the August meeting in Toronto he achieved 85.71 m.p.h.

Larry Richards, a Londoner now domiciled in New York, equalled this fantastic speed with his Class E (stock 10 c.c.) boat when, after the racing at Philadelphia, he reached 85.71 m.p.h. during an official record trial.



Mike Succarde's Class A model steamboat which holds the world record for steam at 68.18 m.p.h. (Pictures by Bob Graham)

The engine of Biederman's record-breaking boat was featured in MODEL ENGINEER for 22 April 1954. It is completely home-designed and home-made, being an oversize version of his 10 c.c. engine. ▣

TORONTO CANADA INTERNATIONAL REGATTA

August 25

Class A		Max Biederman	New York	75	m.p.h.
Class B	1	Henry Parohl	,, ,,	72	,,
	2	Max Biederman	,, ,,	67.10	,,
Class C	1	Max Biederman	,, ,,	85.71	,,
	2	Joe Horvath	,, ,,	84.11	,,
	3	Bob Graham	,, ,,	68.18	,,
Class D	1	Joe Horvath	,, ,,	84.9	,,
	2	Henry Parohl	,, ,,	76.9	,,
	3	Bob Johnson	Toronto	75	,,
	4	Bob Graham	New York	70.86	,,
Class E	1	Bob Graham	,, ,,	76.27	,,
	2	Matt Shears	Toronto	69.23	,,
	3	Rog Matthews	Chicago	48.68	,,
Class F	1	Doug Grable	London Ont.	55.5	,,
Air props	2	Warren Pugh	Indianapolis Ind.	48.9	,,
	3	,, ,,	,, ,,	38.6	,,

August 26

Class A	1	Max Biederman	New York	78.26	,,
Class B	1	Henry Parohl	,, ,,	74.38	,,
	2	Max Biederman	,, ,,	67.16	,,
Class C	1	Joe Horvath	,, ,,	76.92	,,
	2	Bob Graham	,, ,,	70.31	,,
Class D	1	Ray Seavey	Philadelphia	76.59	,,
	2	Henry Parohl	New York	74.68	,,
	3	Bob Graham	,, ,,	72.28	,,

Top boat is Class C world record holder (85.71 m.p.h.); lower boat holds Class A world record (78.26 m.p.h.). Both boats and engines were built by Max Biederman

TORONTO—August 26 Continued

Class E	1	Bob Graham	New York	74.07	m.p.h.
	2	Chas Baxmann	Detroit	65.21	,,
	3	Rog Matthews	Chicago	56.25	,,
Class F	1	Chas Baxmann	Detroit	45.91	,,
	2	Warren Pugh	Indianapolis Ind.	45.45	,,

NOMINATION RACE

August 26

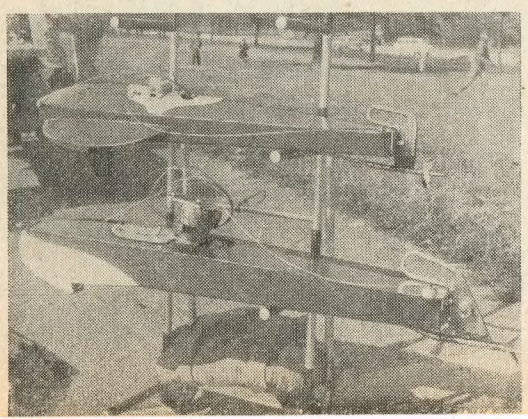
1	Henry Parohl	Error 0.32	m.p.h.
2	Max Biederman	,, 0.36	,,
3	Chas Baxmann	,, 1.09	,,

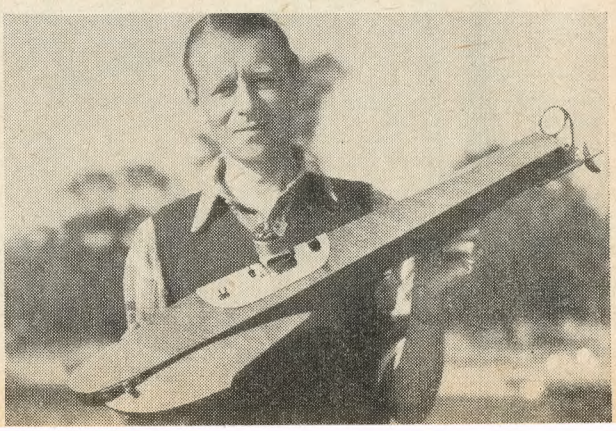
PHILADELPHIA RACE

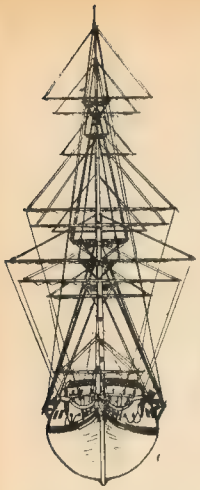
14 October 1956

Class A	1	Max Biederman	New York	77.58	m.p.h.
	2	Andy Balling (steam)	Baltimore	15	,,
Class B	1	Joe Horvath	New York	76.92	,,
	2	Fred Manderville	,, ,,	61.64	,,
	3	Henry Parohl	,, ,,	58.44	,,
Class C	1	Joe Horvath	,, ,,	69.76	,,
	2	Bob Graham	,, ,,	65.69	,,
	3	Jack Scholl	,, ,,	62.50	,,
Class D	1	Max Biederman	,, ,,	82.56	,,
	2	Joe Horvath	,, ,,	78.26	,,
	3	Bob Graham	,, ,,	67.66	,,
Class E	1	Bob Graham	,, ,,	67.41	,,
	2	Hamilton Upshun	Philadelphia		
Tie	3	Larry Richards	New York		
		Fred Manderville	,, ,,		

Larry Richards with his Class E boat that reached 85.71 m.p.h., a world record. Engine is a McCoy. Larry is a member of the New York Model Knights







MYRMIDON

A SHIP-RIGGED SLOOP OF 22 GUNS

Part 2: In this issue R. J. COLLINS turns his attention to the remaining portions of the hull

Continued from 3 January, 1957, pages 16 - 19

With the copper plating taken care of the rest of the hull can now be proceeded with. A stand with quite long arms should be constructed with felt between it and the hull to prevent scratching of the copper.

Screw on the formers and commence planking. I use $\frac{1}{16}$ in. (actual) cut into planks 1 ft wide. Beech veneer, which is about this thickness is excellent. Don't worry if it is a little thinner but don't go any thicker. For the moment forget the wale, the first two planks will take care of that.

From the one you had put on before the plating you now add eight which will reach up to the rail of the waist. In fact, for the waist only the topmost one must be cut down to 9 in. Make sure that both sides are level, as it is so easy to vary. Let this top plank take up any such differences at the waist.

At the fo'c'sle and quarter deck now add two 9 in. planks. This will finish the fo'c'sle. For the quarter-deck you add a further three 1 ft planks. The top plank tapers down to 6 in. at the extreme stern.

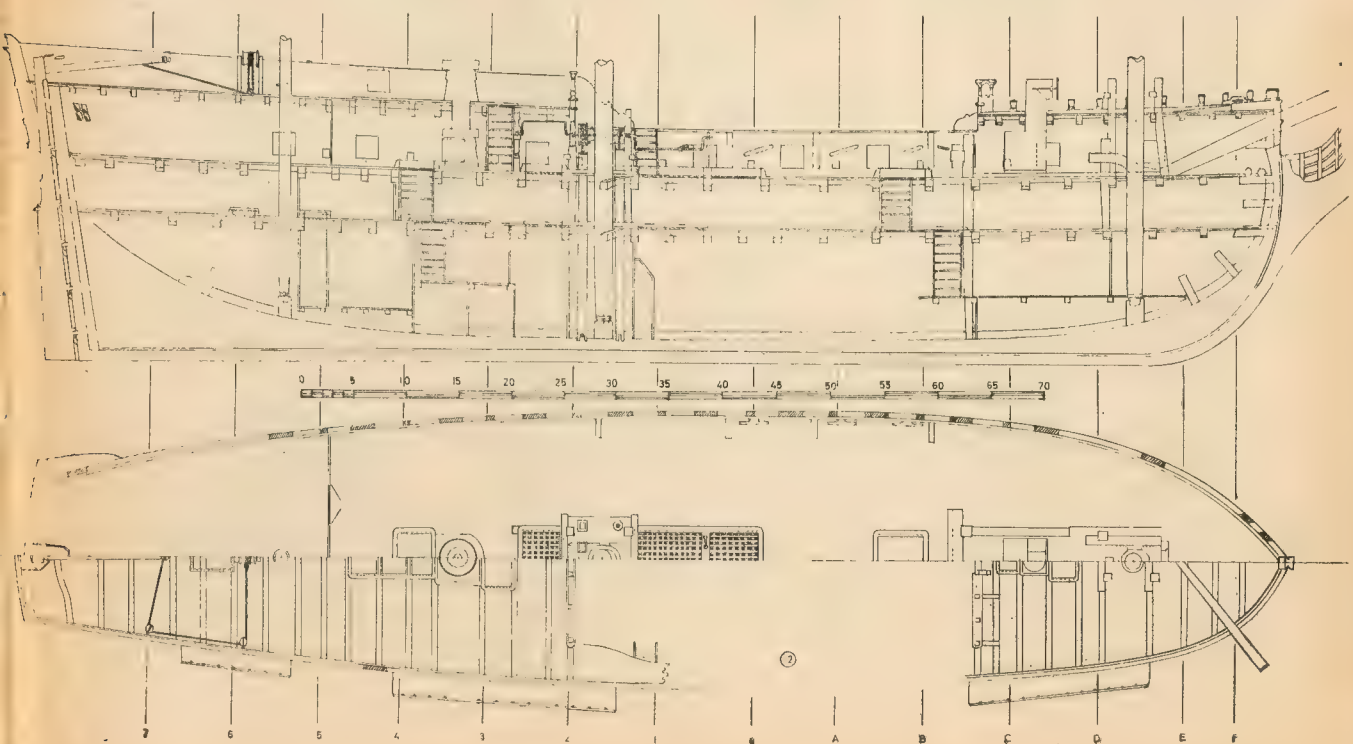
Note that the moulding aft exaggerates the plank sheer and does not follow it.

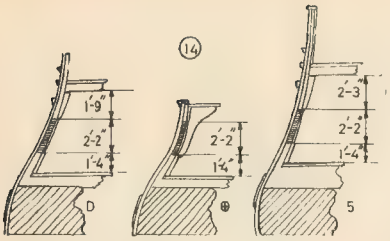
Inside the hull lay the deck, preferably of some whitish wood. I generally make this of two pieces, allowing the join to come to the middle where most of it is covered by the hatches, etc. The deck should be 3 in. thick. I don't know the width of the planks but I imagine 9 in. would be about right. Score these lines on the deck pieces.

With the two halves held close together (with a strip of paper glued beneath) mark on them the position of the deck fittings (Fig. 12). Cut all the necessary openings and put the deck back and firmly fasten down. Wooden pegs into the bottom cross pieces of the formers will hold. Don't forget to clean the deck before fixing.

Cut some pieces of wood as thick as the formers and of sufficient width to bring the tops up to 1 ft 4 in. above the deck. If you haven't cut the deck to fit around the formers this packing must allow for the additional depth and this will vary to take in the deck sheer. Another thing to watch is that the sills and tops of the ports must be level with the deck and not at right angles to whatever part of the tumble-home they break into.

Fit all these pieces as snug as possible, making sure they are shaped both to the curve of the hull and to





the tumble-home. Glue them into position (Fig. 13).

Tight down to the deck, around the inner wall of the hull arises the first planking, called the spirketing. This is heavier than the rest and reaches to the bottom of the ports. It might be some advantage to put this in before the packing pieces just described, as an easier method of keeping the port sills the correct height, 1 ft 4 in., above the deck. Whether you can make it of one piece of two 8 in. planks depends upon what wood you are using and how easily it bends. It is 3 in. thick.

Back to the packing. Again using wood of the same thickness as the formers, cut some strips, this time across the grain, 2 ft 2 in. wide. Before you cut, study the bevel. These pieces are to be of sufficient length to leave a correct-size gunport when placed in position. Note that one of each pair must have the oar port cut from it. These are 9 in. square and should come in the corner, right up against the former.

When this layer of packing pieces is in position and firmly glued, cut the port openings through the outside planking. It would be added strength if each plank so cut was pegged afresh, close to the edge of the port. Even safer if such pegging was done before the opening was cut.

The third set of packing goes on top of what is already there. In the waist and by the quarter deck this should reach to the top of the formers but for the fo'c'sle it should only come up to the level reached for the waist.

The inner planking is now brought up to the level of the top of the ports with planks (or single pieces) of not more than 2 in. thick (Fig. 14). From the port tops to the level of the bottom of the beams is the clamp which starts at 3 in. and expands to a good 4 in. At the fo'c'sle this is 1 ft 9 in. wide and at the quarter deck it is 2 ft. 3 in.

Above this leave a 9 in. space which will take the 6 in. beams and 3 in. deck. This is the same for both the fo'c'sle and quarterdeck. From here to the top rail is just 2 in. planking. There is another gunport on the quarter deck, 2 ft 2 in. square and 1 ft. from the deck.

Above the gunports in the waist the planking stops 3 in. below the capping rail. This allows for the edge of a 2 ft gangway which extends the whole length of the waist. This is only a foot below the fo'c'sle deck but rather more below the quarter-deck. The draught doesn't show it but I think I should put a step here, halving the distance. This gangway appears to be a permanency, but has no beams and was probably supported by knees rising from between the ports.

Around the fo'c'sle is a number of timber heads. Two of these should be already there as part of the formers. Cut and shape the rest and push them down between the outer and inner planking. These are 1 ft 2 in. above the rail and are 8 in. wide × 3 in. thick. Their shape and details can be seen from Fig. 15.

The entire stern can be cut from one piece which must be thick enough to allow it to be about 9 in. thick after it has been shaped to the curve. Cut out the windows, but not the centre one which is a dummy. Now cut back some of the outer surface as shown in Fig. 16. Fit Perspex, already scored for the window frames, into this. It will probably be easier to put one piece right across and paint the dummy black. The munions are fitted in afterwards on top of the Perspex. The ornamentation is cut from thin wood, rounded and trimmed and glued on as low relief.

There are a pair of ports on the lower counter. I think I should only indicate these by scoring and fastening on dummy hinges. The two inner windows are also continued down as ports; these too, I should only indicate.

Painting has to be done more or less as one progresses. Draw two lines on the hull. One 18 in. below the ports and the other level with the top of the ports. These lines follow the same shere as the ports (which is the deck shere as against the plank shere). Between these two lines the colour should be a rather pale ochre. All the rest is black with the mouldings and ornamentation also picked out in ochre.

The bare hull now completed, we start at the bow to tackle the outside fittings. Naturally, you can do them in any order you wish.

First the wale is to be completed. This will take up the room of two planks. It does not protrude as much as the ones on older ships, certainly not more than 2 in. It could be laid on in one piece but a better effect, and more correct, would be to cut a number of " anchor stoke " pieces and glue and pin them into position. Make the widest part 1 ft 3 in. and the narrowest 9 in. Length 15 ft. Start at the bow and let them end as they will at the stern (Fig. 17).

The Admiralty draught shows no figurehead but by this time individual figures were replacing the lion. I don't know what sort of figure this ship had, but as *Myrmidon* was the name given to a type of Greek soldier. I have used one for the figurehead here. The sketch shows also the manner of making it. It should be painted in natural colours (Fig. 18).

Behind the figure is the headboard from which the three rails reach back to the hull. I am still trying to find out a fairly simple way to make this assembly, but up to now " the fairly simple way " eludes me.

I bend a piece of wire to the shape of the top rail and from this cut out a card template. From this again, having tried it for size, I cut the rail from black Perspex. This, which is cut as carefully as possible, can if necessary be bent a little under gentle heat to fit perfectly. The other rails follow the same curve.

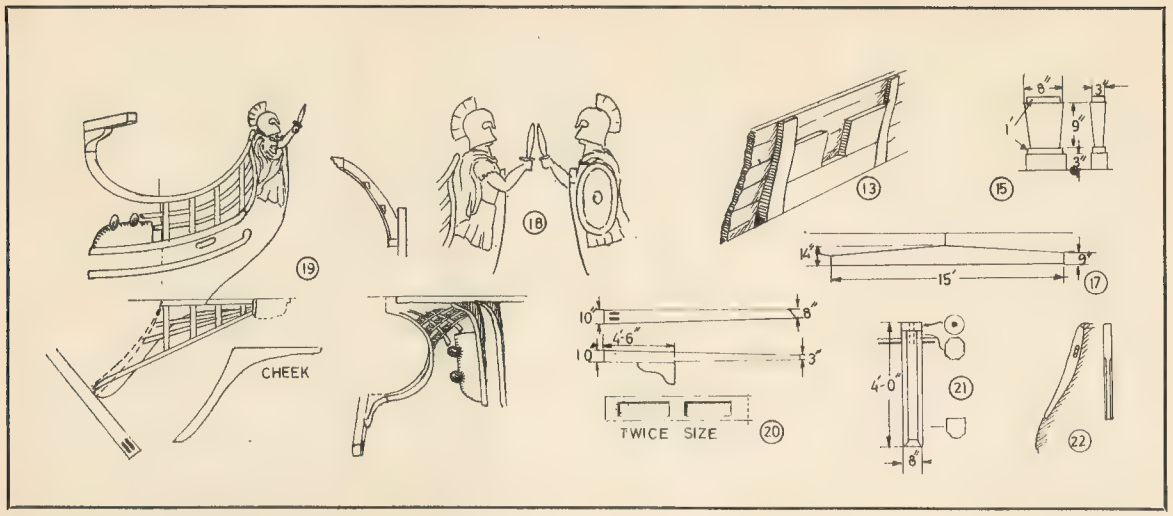
The top rail is roughly triangular in section with the top and back about 4 in. at the headboard, about 6 in. at the half-way mark and it then changes shape to a flattened 9 in. × 2 in. against the hull where it reaches to the lower moulding. The other two rails are 3 in. expanding to 4 in. against the hull. The timbers are 9 in. deep × 4 in. wide.

A thin covering piece, decorated with panel effect, is fastened to the outside, so enclosing the rails. Two knee-like anglepieces, called the upper and lower cheek, are fitted into the angle between the beak and the bow. This part of the bow, by the way, is called the knee of the head. The cheeks are 4 in. thick at their extremity, where they end in a little ornamented curl, and thicken to 6 in. against the hull. The outer edge is moulded (Fig. 19).

Mouldings can be quite easily made by cutting out the reverse from the back of an old hacksaw blade and running this along the strip to be moulded. In the case of long strips it is best to hold the cutter in a vice and run the strip along the blade.

As a part of the bow assembly is the bolster, a piece of heavy timber fitted against the hull and the upper cheek and serving as a part of the hawse hole. This is to take up some of the friction and strain of the cable.

The cathead (Fig. 20) can almost



be considered another part of the bow although at this period it was not integrated so completely into the general design. The cat itself stretches across the fo'c'sle deck and would be bolted to the deck beams. It hangs 4 ft 6 in. over the bow and is 10 in. square at its outboard end which has a double sheave.

The width tapers a little to 8 in. and the thickness to 3 in. above the deck level. The outboard end is decorated in the usual panel design which can be easily (if carefully) cut with a sharp chisel. A small bracket reaches half way out and the downward arm to the end of the top beakhead rail. On the fo"csle rail behind it is a built-in block. I have shown it as it appears in the draught but most of those I have seen in models gives this as a snatch block.

Two eye-bolts, more or less aft of the hawseholes, are for the bowsprit shrouds.

Against the outside of the fo'c'sle rail and again in three places against the rail of the quarter-deck are heavy timbers which form supports of the small swivels (Fig. 21). Their height varies a little but the quarter-deck trio tops the rail by 6 in. The exact shape is shown in the sketch. The top is strengthened by an iron band which can be simulated with a thin strip of gummed paper; it has to be painted.

A central hole, about 9 in. deep, is drilled down the top. I will discuss the actual guns later when I deal with the inboard fittings.

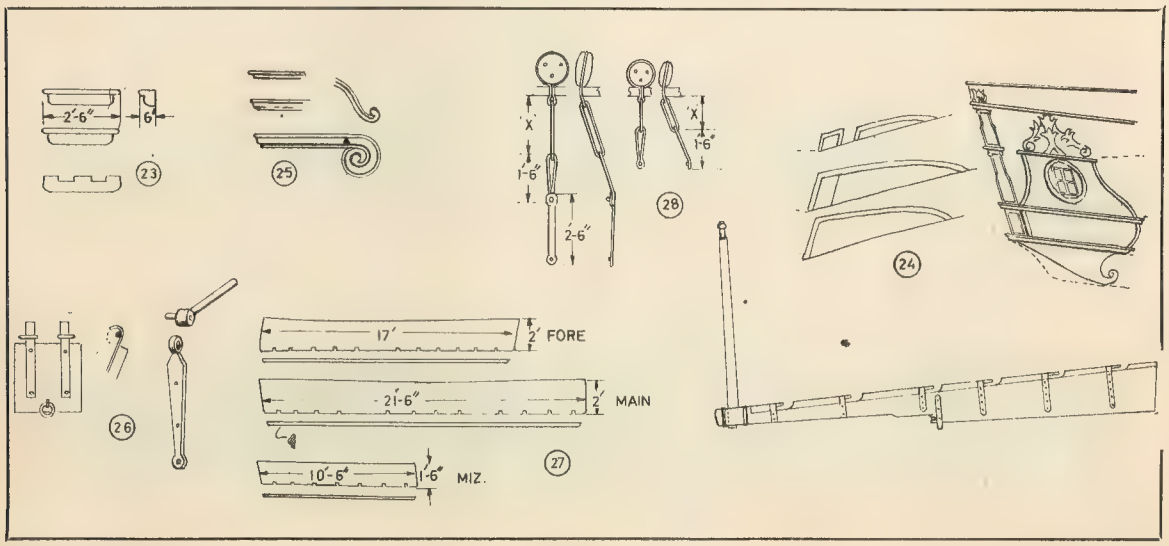
Just aft of the fo'c'sle, and again just forward of the quarter-deck hances, are some timbers which run down the side of the hull from the main rail to the top of the wale; these are the chess-trees. The forward one is 6 in. wide and has a sheave in it for the main tack. A lead-in sheave is let into the hull a little way forward of this. The two after ones are 4 in. wide and have no sheave. Between these two is the double lead-in let into the hull, the top one is for the fore sale sheet (Fig. 22).

There is an eyebolt forward of port No. 4 and another forward and below port No 6.

Just forward of the quarter-deck hance is a row of footholds, seven of them. These are 2 ft 6 in. long by 6 in. They are actually lengths of moulding (Fig. 23).

Several more eyebolts are grouped near the last gun port.

The light to the cabin can scarcely be called a part of the " quarter



gallery"; it is more of a badge. I think the whole thing can best be made from the solid and shaped. The carved top is only low relief, and can be done by cutting out the pattern and gluing on the shaped base. I find that Perspex makes the best "glass" as the framing can be inscribed upon it. The panelled effect can be a repeat of what has been described for panels or perhaps you can obtain some strips of inlay which may be worked in (Fig. 24).

There are several bands of moulding running almost the entire length of the hull. I have already described how this can be made. The lowest band, which fits under the capping rail of the waist, is 5 in. deep × 2 in. thick. From the bow to the beginning of the quarter-deck this follows the plank sheer but from there aft it rises yet another 9 in.

The second moulding above is 4 in. deep × 2 in. The third which starts under the capping rail of the fo'c'sle, is 3 in. deep × 1 in. thick. These two follow the sheer of the first. The top moulding of the quarter-deck can be worked on the edge of the capping rail. Note that the first and second mouldings finish short of the quarter badge. The hancing pieces are best carved from the solid and glued into place (Fig. 25).

Only three of the ports have port lids (Fig. 26), Nos. 1, 10 and 11. These are quite straightforward and are the thickness of the outer planks of the hull. The hinges are made of thin metal; some left-overs from the copper sheathing will do quite well.

A thin strip is pinned onto the lid, the short overhanging bit is curved round a bent pin firmly fastened into the hull. This doesn't sound very workmanlike but as a matter of fact it makes a very good and workable hinge.

For a ship of this size I imagine that only one ring bolt would be needed for the port lifting tackle. I show a proper hinge for those watchmaker-like people amongst us who can do such things. I wish I could.

The lower moulding is interrupted in three places to take the channels (Fig. 27). The fore and main are 2 ft wide × 4 in. thick. The fore is 17 ft long and the main is 21 ft 6 in. The mizzen is 1 ft 6 in. wide by 3 in. thick and is 10 ft 6 in. long. The metal strops of the deadeyes rest in small recesses cut in the edge of the channel, they are then covered by the strip of moulding which extends the whole length of the channel.

The deadeyes have a diameter of half that of their mast at its widest. This makes each set of deadeyes of a different size. If you can work to such fine limits all to the good, but the following suggestion will rather simplify matters for those who can't.

The following dimensions, in inches, are actual and not scale: Fore and main $\frac{3}{16}$, fore top main, top and mizzen $\frac{1}{8}$, fore topgallant, main topgallant and mizzen top 3/32. The backstays have the same sizes as the shrouds. Thus the fore channel has nine $\frac{3}{16}$, one $\frac{1}{8}$, and one 3/32; the main channel has ten $\frac{3}{16}$, one $\frac{1}{8}$, and one 3/32; the mizzen channel has six $\frac{1}{8}$, and one 3/32.

For the purpose of this article the deadeyes are referred to as large, medium and small.

The metal strops make a 4 in. loop under the channel and the strop of the medium and small make a 3 in. one. Engaged in this is an iron link which varies in size to suit the angle of the shroud. A second link, 1 ft. 6 in. long, joins this to an iron strap 2 ft. 6 in. long × 3 in. wide; 5 in. where the bolts are. This strap reaches to within about an inch of the wale.

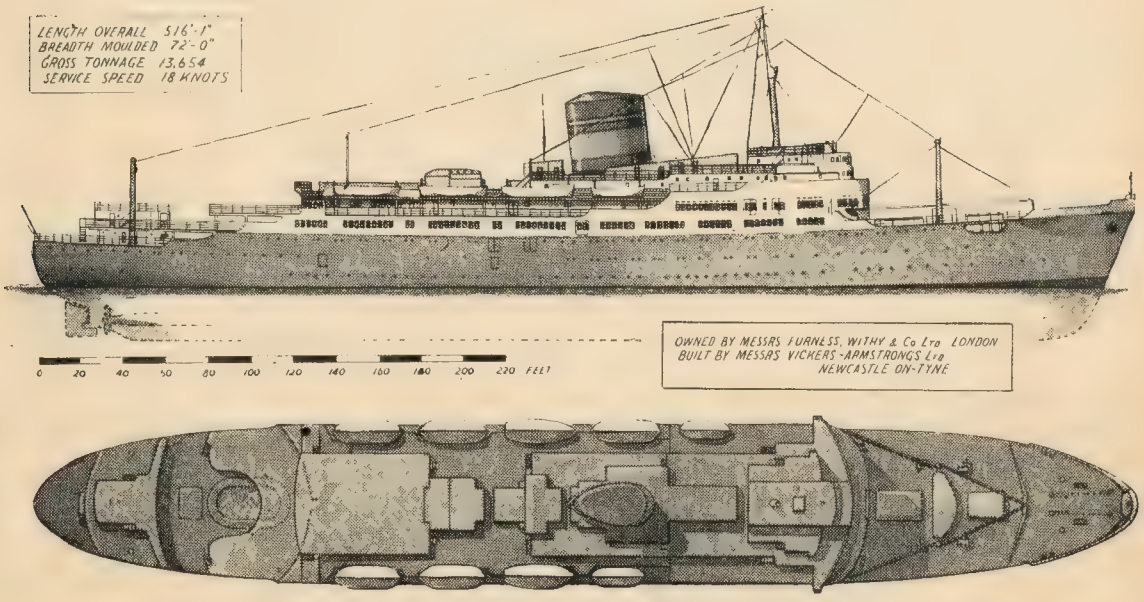
The deadeyes of the backstays and the mizzen shrouds have the links but no straps. Between some of the straps at the fore and main are large 8 in. ring bolts arranged at the shroud angles. These are shown in the plan, Fig. 28.

The rudder is quite straightforward but is very tall, the top reaching above the quarter deck. There are six pintles of which the top two are inside the hull. It is copper sheathed to the waterline with the straps of the pintles on top of the copper (Fig. 29).

● *To be continued*

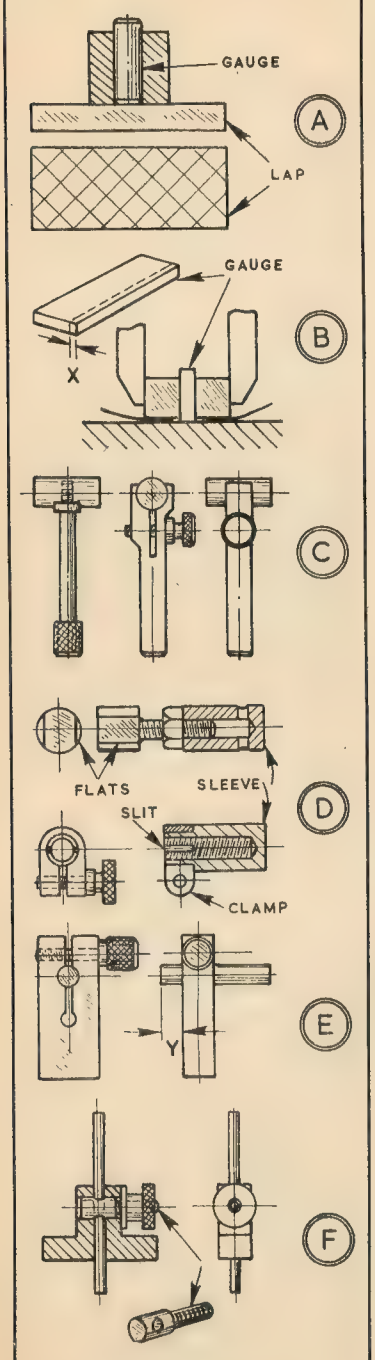
Ship Shapes

THE PASSENGER LINER *OCEAN MONARCH*


LENGTH OVERALL 516'-1"
BREADTH MOULDED 72'-0"
GROSS TONNAGE 13,654
SERVICE SPEED 18 KNOTS
0 20 40 50 80 100 120 140 160 180 200 220 FEET
OWNED BY MESSRS FURNESS, WITHY & Co Ltd LONDON
BUILT BY MESSRS VICKERS-ARMSTRONGS Ltd
NEWCASTLE ON-TYNE

Simple gauge construction

By GEOMETER



Various types of gauge that can be readily made in the workshop

IN THE LAST article was described the principle of obtaining accurate lengths in lathe work. For the most part, the gauges suggested were standard-size objects such as drills, silver-steel rod, ground tool shanks which are convenient in the sizes they cover. Larger sizes, however, require specially-made gauges, which for simple length dimensions can be in round or flat material.

A micrometer or vernier caliper is desirable for measuring gauges, though the fact that the instrument may have a fixed limit of 1 in. does not debar its use in making longer gauges. For example, to obtain a 2 in. dimension, two 1 in. gauges can be made and placed end to end for a careful check by ordinary calipers to make a single 2 in. gauge. The same applies to fractions, such as $1\frac{3}{4}$ in., when one of the possible combinations would be a 1 in. gauge and a $\frac{3}{4}$ in. one placed end to end.

In fact, with no other measuring devices than a steel rule and ordinary calipers quite accurate gauges can be made on the above principle. Several gauges are made which all measure as near as possible alike on the calipers, and which together total a given dimension on the rule—when the total error will be divided between the gauges.

Silver steel is best

For end gauges, material $\frac{1}{4}$ in. to $\frac{3}{8}$ in. dia. is convenient. For occasional use, it can be left soft, though hardening and tempering are desirable if permanent or durable equipment is the aim. Silver steel is ideal in this respect. Pieces to make gauges should be faced over-length in the lathe, then if they are to be hardened and tempered these processes follow.

Finishing accurately to length is by lapping, as at *A*. The process requires a guide bush or block for the gauge —guide block having been drilled (preferably also reamed) and faced at a single setting in the lathe, for the end to be square with the bore.

The lap is a piece of flat material, such as cast aluminium, brass or cast iron, and may have some file grooves across its face. For convenience, it is held in the vice, its face charged with fine grinding paste, then the block and gauge rubbed on it. Very small controlled amounts can be removed from gauge faces by this means, and the faces maintained or brought square. Cleaning can be in paraffin.

For a plate gauge, as at *B*, where a few thou, *X* have to be removed from one edge, the principle is similar. A wide block is clamped each side with the assembly stood on a flat surface, the wide blocks being packed up by strips of paper to leave the edge of the plate gauge slightly protruding.

Clamp-type holder

In making a long end gauge from several in line, they can be placed in a piece of tubing, or joined in pairs by sleeves with grubscrews. For individual handling, either of the means at *C* can be employed. Using a screw-in handle for a set of gauges, each must be drilled and tapped in making before hardening and tempering. With a clamp-type holder, however, as can be made from flat stock, the gauges are simply pushed in and gripped. As shown, the jaws should allow the side of the gauge to lie on the work, to ensure accuracy in setting tools.

Numerous gauges can be avoided by employing adjustment, as at *D*. The screw portion is made from round stock, its thread kept square by tailstock die-holder, and flats are filed to hold in the vice. The tapped sleeve piece is drilled cross-wise for a tommy-bar and set by locknut. Alternatively the end of the sleeve can be turned down, slit lengthwise, and a clamp fitted. Accurate adjustments are then more easily made.

Diagrams *E* and *F* show how adjustable depth gauges can be furnished with plain clamping or a cross-drilled screw and nut. Depth *Y* is set from rule or gauge block. ▣

A SIMPLE STEAM ENGINE-10

Continued from 24 January 1957, pages 128—130

EDGAR T. WESTBURY writes more about boilers and firing methods

My views regarding the desirability of using solid fuel have not been allowed to pass unchallenged; several readers have expressed the opinion that much of the interest in running steam engines lies in boiler firing and management and that only solid fuel gives the essential touch of realism in this respect.

Well, the most attractive thing about model engineering is that you can make or do what you like, when and how you like; and I certainly have no intention of quarrelling with readers over their individual preferences. I am not personally thrilled by the operations of shovelling coal on a fire, and afterwards raking out ashes and clinker, not to mention cleaning the tubes and smokebox; but I quite appreciate that these tasks may hold a nostalgic fascination for others and I do not deride their ideas.

Model engineers are often sadly misunderstood by people who describe them as mentally-arrested because they "play with toys"—but why this should be considered any more infantile than any other adult pastime —I will not indulge in odious comparisons—has always defeated me. Every man to his taste—and no interference with the other fellow's taste —are sound policies in promoting goodwill to all men.

But to those who desire to run small and simple steam engines in the simplest possible way, as many readers undoubtedly do, the advice I have already given in previous articles still holds good.

To the few who have demanded more information on solid fuel I can only reiterate that it is only possible for me to advise them within the limits of my own experience. I have found that the disadvantages and difficulties of solid firing are in inverse proportion to the size of the boiler, and in small marine plants, which have been the subject of many of these queries, neither bulk nor weight can well be spared, as a general rule.

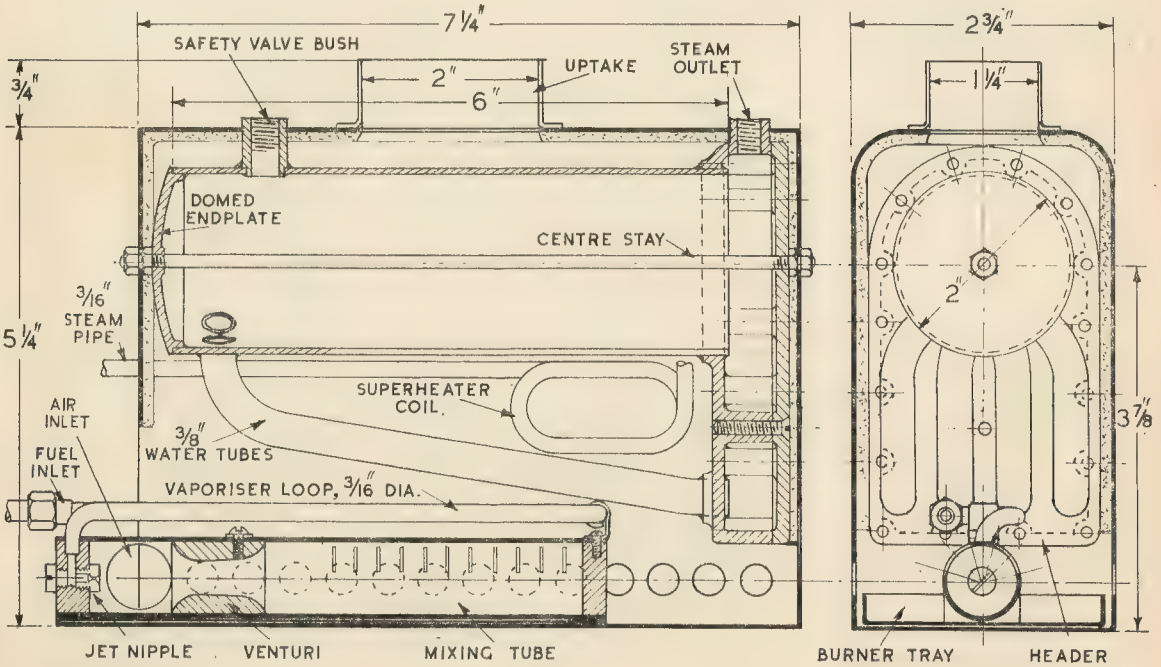
There is, of course, plenty of room for experiment in these matters and I know of several ventures of this nature, including a solid-fired flash plant by Mr A. E. Perman, of West London Model Power Boat Club, whose tug *Smoky* is a hardy perennial at M.P.B.A. regattas; but their success is as yet unconfirmed.

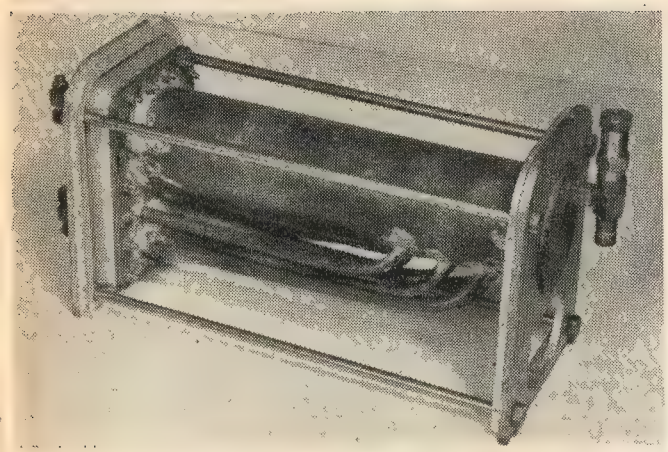
Wet-back water-tube boilers

For the present, at least, we may defer the matter of solid fuel, though I do not discourage discussion about it. Many readers have asked for information on the design of water-tube boilers for marine work as an alternative to the predominant internal-flue type, which is heavy and relatively inefficient for boats which are required to have a fair power-weight ratio.

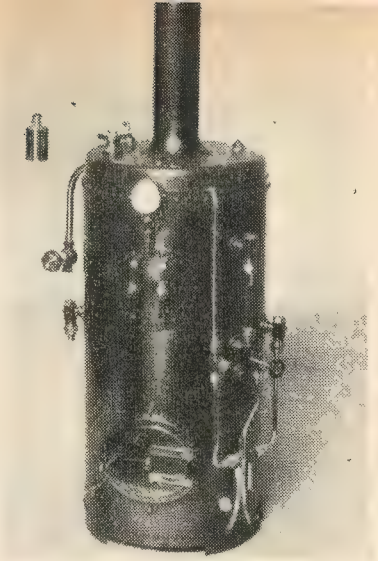
The general design of these boilers has been discussed in my articles "Utility Steam Engines" published some three years ago, and although it is fairly easy to produce "new" designs of boilers on paper it is not so easy to guarantee their superiority of performance. Some readers have asked for more detailed blueprints of boilers, but in view of the fact that hardly any two querists seem to re-

General arrangement of wet-header type water-tube boiler fitted with diffused-flame vaporising burner





Left: Water-tube boiler by G. McKerrow, with wrapper plate removed to show its internal construction



Right: Solid-fired vertical boiler with all fittings including feed water injector, seen on the S.M.E.E. stand at the M.E. Exhibition

quire exactly the same type or size of boiler it is not possible to fulfil all their demands.

Even in full-size, boilers are often somewhat inexact in dimensions and specification, and many of the stationary and marine types in the past have been built more or less by rule of thumb without recourse to carefully prepared drawings or working to close limits.

A standing joke—though maybe a libellous one—about the boilermakers in Naval dockyards was that they marked out the plates with the toe of a dirty boot and indicated the positions of holes by a well-directed jet of tobacco-juice ! All joking aside, however, it is a fact that boilers generally do not call for close limits of accuracy and relatively simple drawings should suffice for constructing them.

The most common form of water-tube boiler for very small steam plants is that credited to the late Fred Smithies, and many variations of this type have been evolved and described in MODEL ENGINEER since it was introduced over 50 years ago. One of the developments, which may justly be claimed as an improvement, consisted of fitting a cast or fabricated header element to one end of the main drum, the lower part of which provided a connection for the water tubes, which were brazed into the underside of the drum at the other end.

The header thus provided a very efficient " downcomer," being somewhat cooler than the rest of the boiler, especially the water tubes, and rapid circulation of the water was promoted. Boilers of this type, described as the " wet-back " or wet header type, were used in certain types of locomotives by the late Henry Greenly and they were also adapted for use in marine plants by other constructors, though they seem to have been neglected in recent years.

Some time ago, Mr G. McKerrow, a North British steam enthusiast, submitted to me a boiler of this type which embodied some interesting constructional features both in the boiler itself, and the outer casing. The header in this case is fabricated from copper, with front and back plates made from $\frac{1}{8}$ in. sheet, one of which is bored to fit the $2\frac{1}{4}$ in. copper tube forming the main drum, and brazed thereto.

Aluminium frame

Between this and the second plate is fitted a solid frame of aluminium $\frac{1}{2}$ in. thick, and the assembly is bolted up with 20 $\frac{1}{8}$ in. bolts equally spaced all round the edge. A bank of 10 water tubes, $\frac{1}{4}$ in. dia., is brazed into the header and the drum at the two ends respectively.

The boiler casing incorporates two light aluminium cast frames, with apertures cut out to fit the drum and the header, and held together by four long tie bolts. These frames have a rebated edge which locates the wrapper plate, made from a single sheet of metal (brass in the particular case, but I should prefer iron), which on final assembly is lagged internally with asbestos millboard. At the drum end, the cast endplate has a lower aperture to accommodate the blow-lamp burner.

This boiler weighs $4\frac{3}{4}$ lb. and should be capable of steaming a powerful engine such as a Stuart Double-ten or a Warrior twin; the weight of water in the boiler would probably amouut to about 50 per cent. of the boiler itself. Overall dimensions are approximately 9 in. long × 4 in. wide × 5 in. high (less uptake).

I have often considered using a boiler of somewhat similar design to this, though I have never got around to constructing one up to the present. Preliminary sketches were, however, made for it and I have managed to find them as I think the design may be useful to model power boat constructors. The boiler was intended to steam either a $\frac{3}{4}$ in. × $\frac{3}{4}$ in. double-acting single-cylinder engine or a single-acting twin of similar dimensions and I am confident that it would be quite adequate for the purpose.

The header in this case is cast in two pieces of bronze or gunmetal, which are machined on the joint faces and bolted together with 16 $\frac{1}{4}$ in. or 5 B.A. bolts. All bosses for fittings, which should include gauge glass, pressure-gauge, feed check and blow-down, in addition to the steam outlet at the highest point, may be cast on the header. The seating for the drum is machined, and the endplate at the reverse end may either be cast or machined from solid.

Only four $\frac{3}{8}$ in. water tubes, the main length of which is inclined at about 10 deg., are provided, and though it would be possible to crowd in a good many more of smaller diameter I do not consider that this would result in a proportionate gain in steaming efficiency. In my experience, rapid circulation is difficult to obtain, or at any rate control, in smaller tubes, owing to internal skin friction and steam-locking by the formation of bubbles.

In this boiler, the size of the tubes is sufficient to enable rapid and orderly circulation to be maintained at maximum rates of steaming, and the main steam outlet, being well out of the circulation path, is not liable to be affected by turbulence and ebullition, which often cause priming in other types of small boilers.

One practical disadvantage of boilers in which design calls for flat surfaces is that their resistance to pressure is relatively weak and elaborate methods

of staying them are often necessary. In this design the cast headers provide fair rigidity, especially if they have cast bosses interrupting the flat expanses of metal; but two stays are provided, the upper one being in the form of a long tie bolt extended right to the opposite endplate. Extensions of these stays may be used to support the boiler in its casing, which may be fabricated in any convenient way, preferably in sheet iron of not less than 24 gauge, and well lagged internally.

Firing

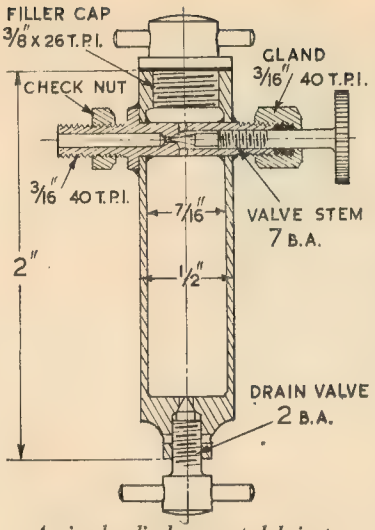
This boiler is intended to be fired by a diffused-flame vaporising burner of somewhat similar type to that described in the previous article. The mixing tube is $\frac{7}{8}$ in. dia., with not less than 20 slots, not exceeding 1/32 in. width × $\frac{1}{2}$ in. long, disposed at about 45 deg. on each side of the tube to spread the flame as widely as possible. It should have entirely unrestricted air inlets, either round or rectangular, close to the jet nipple, and the venturi, which should be made adjustable for position, should have a throat diameter of about $\frac{3}{8}$ in. dia.

A standard Primus nipple may be used, or a needle valve and gland may be fitted to enable the jet orifice to be controlled; the needle, by the way, should extend right into the nipple so that it is thereby made self-cleaning. The vaporiser is a single loop of steel tube, $\frac{5}{16}$ in. × 20 or 22 gauge.

A tray is provided attached to the underside of the tube, with a layer of asbestos laid in it to enable a small quantity of spirit to be applied for starting up. The burner must, of course, be supplied with fuel from a pressure tank as in the normal type of blowlamp, and a regulating valve in the supply line is an advantage.

Burners of this type require adequate ventilation, as they do not induce a flow of air externally in the manner of a torch burner, and in addition to the main aperture in the end of the casing, ventilation holes of ample size should be provided all along both sides, though direct draughts must be avoided.

In this case 26 air holes $\frac{3}{8}$ in. dia. are provided in the casing. Spaces around the drum and tubes must also be adequate, and the uptake should not be smaller in area than that shown, unless induced draught is provided; but it may be made round or oval to suit the shape of the funnel fitted to the boat. A superheater coil of four to six turns of $\frac{3}{16}$ in. tube, flattened to fit easily into the space above the water tubes and fed from the main steam outlet, will ensure dry steam and avoid loss of efficiency through condensation.



A simple displacement lubricator with feed control valve

Displacement lubricators

Several readers have asked for information on displacement lubricators for supplying oil to internal working parts of steam-engine cylinders and valve gear. One is rather inclined to take these small items for granted and assume that readers know all about them, but this is not always the case. There are several methods of supplying oil to parts which are subject to steam pressure, but the simplest of them all is by the use of a sealed oil vessel in which gradual condensation of steam (which passes through the vessel, or is admitted to it under control) displaces the oil. The oil being of lower density than the condensed water, it rises to the top of the vessel and is carried by the steam into the engine.

The conventional form of displacement lubricator, in a size suitable for engines of about $\frac{1}{2}$ in. bore upwards, can be obtained ready made, but it is of course much more interesting to make it yourself, as these readers wish to do.

I described a simple displacement lubricator in connection with the design of the Warrior engine in 1952, but I am now illustrating an improved (but not, I hasten to add, original) design which enables the rate of oil feed to be controlled, and avoids the annoying tendency to gulp all the oil at once, which is often prevalent in these small lubricators.

The body of the lubricator may be made from solid brass rod, or from $\frac{1}{2}$ in. × 20-gauge tube, with top and bottom ends silver-soldered on. I consider the former method best, and really simplest, if one does not object to the chambering-out of the centre portion, which calls for the use of a small boring tool. The filler cap must be accurately machined and threaded, likewise the tapped hole in the body, so that it is quite steamtight when fitted; a thin fibre washer is permissible, but if it can be dispensed with in favour of a metal-to-metal joint, so much the better.

Draining condensate

Some care is necessary in machining the tube of the control valve, to get all parts concentric and in line. The valve stem should be of German silver, phosphor bronze or stainless steel, and should have an acute-angled point for fine control. Similar material may be used for the drain valve, but a much more obtuse point, about 60 deg. included angle, is more appropriate here.

A cross hole in the bottom end of the body allows the condensate to be drained before refilling the vessel without completely removing the drain valve. The outer end of the control valve body is screwed to fit into the steam-chest or main steam-pipe of the engine, and a check nut enables the lubricator to be locked in the vertical position.

It is advisable to silver solder the control valve to the body (both sides), though sweating with soft solder may be sufficient for engines working on low pressure.

It is important to remember that as these lubricators depend on the condensation of steam for their operation, they will not work on highly superheated steam; also, flash steam, whether excessively hot or not, generally fluctuates too much in pressure to operate these lubricators satisfactory.

In such cases, the type of displacement lubricator which operates from the feed-water supply system, by means of a bleed valve, may be used, or alternatively a mechanical oil pump of some kind is perhaps best of all.

Internal lubrication, to be really effective, depends more on quality than quantity; it is important to use a really good cylinder oil, and the thick, black-treacly kind is not always the most satisfactory. I have found the Shell Valvata oils, which are made in several grades to suit temperature and other conditions, suitable for all small engines.

Oil may be used "straight," or with the admixture of colloidal graphite, which is a very effective and economical lubricant.

The size of lubricator shown will contain enough oil to keep a Warrior or Double-ten engine lubricated for a run of 15 to 20 min. if suitably regulated.

● *To be continued.*

Two UGLY DUCKLINGS of the locomotive world

By E. F. CARTER

WAY back in the mid 1860s when John Ramsbottom was in charge at Crewe and John Chester Craven was directing the locomotive fortunes of the London Brighton and South Coast Railway the general arrangement of the engines of this country had become more or less standardised; chimney at the front end firebox and cab at the rear and cylinders mounted forward alongside or under the smokebox.

But on the Continent—in France, in particular—the locomotive engineers of the day were indulging in some very bold departures from the orthodox in locomotive design. Two such engines—one a passenger and the other a goods tank—were built at the Paris works of Mm. Gouin et Cie in 1866 to the original designs of chief engineer Charles Petiet of the Chemin de fer du Nord.

M. Petiet's aim was to obtain maximum tractive effort without damaging the permanent way (the latter at the time was of a very light character to say the least !) and he obtained the desired result by dividing the load between numbers of wheels. In the case of his 0-6-6-0T goods engine he fitted four short-stroke cylinders instead of two normal ones, this to avoid coupling together all six wheels on each side of the engine. He also gave the extreme front and rear pairs of wheels 2/3 in. end-play to assist short radius working.

M. Petiet's 0-2-6-2-0T passenger locomotive, of which No 437 was the prototype, was carried on five pairs of wheels. The two end pairs 5 ft 3 in. in diameter were the drivers their centres being placed 16 ft $11\frac{5}{16}$ in. apart.

The intermediate space between them was taken by three pairs of 3 ft 6 in. carrying wheels.

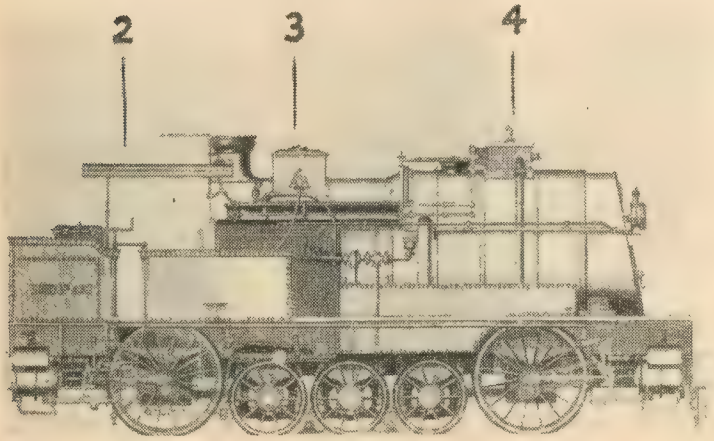
The boiler, which was fed by a pair of Giffard's injectors and was 4 ft $5\frac{3}{4}$ in. inside diameter, contained 356 × 1 37/64 in. tubes 11 ft $5\frac{3}{4}$ in. in length; this gave a total heating surface of 1,620 sq. ft. As the tubes took up so much room in the boiler, steam space was supplemented by a " dryer " or superheater which consisted of 19 × $3\frac{1}{8}$ in. iron tubes through which (as well as around the casing) exhaust steam passed on its devious way to a horizontal chimney. This " dryer " exposed 129 sq. ft of heating surface.

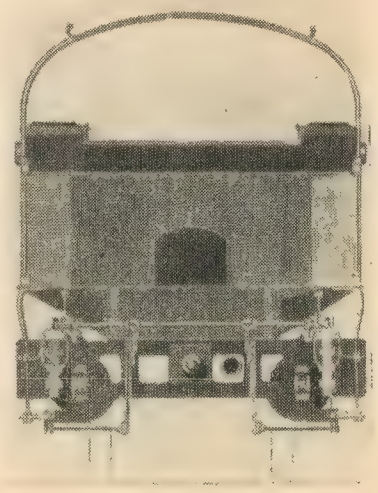
The boiler, which was pressed to 118 p.s.i. was carried high above rail level so that the firebox could be extended over the three pairs of central carrying wheels—the increased width thus obtained allowing for 28.2 sq. ft of firebox area needed for the purpose of burning slack coal, which was much used in France. The firebox measured 4 ft 10 in. long × 5 ft $9\frac{7}{8}$ in. wide, which gave it a heating surface of 109 sq. ft.

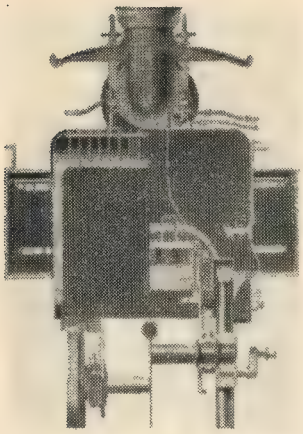
The four cylinders were each $14\frac{3}{16}$ in. × $13\frac{7}{16}$ in. stroke, the combined area of the four cylinders being equal to a single pair $20\frac{1}{16}$ in. dia., but the unusually short stroke enabled the same relative wheel speed to be maintained as in large driving-wheel engines with pistons making strokes of usual length. Outside valve motion was fitted in which the eccentric rods were connected to pins formed on overhung return cranks. The two sets of valve gear for the front and rear pairs of cylinders were controlled by one reversing lever, but a separate regulator was provided for each pair of cylinders.

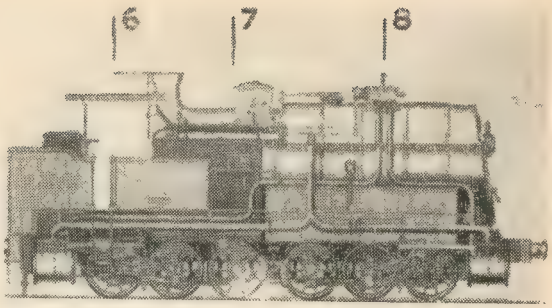
No 437's wheels were of wrought

Right: Transverse section of passenger locomotive No 437 behind the rear driving-wheel axle
Below: Side elevation of the 437









Above: *The No* 601 *goods locomotive*

Centre: *Transverse section of the* 437 *at front driving-wheel axle*

Left: *Cross-section of* 437 *at the firebox*

iron with forged-on counter-balance weights, and her frames were placed inside the springs. Six tons of water were carried in a " belly tank " which held 1,550 gallons, while two tons of slack coal were carried in a rear-of-footplate bunker. Loaded thus, the engine's total weight was 47 tons, of which almost 21 tons was on the four driving-wheels.

M. Petiet's goods engines were of a similar arrangement, save that they were carried on six pairs of 3 ft 6 in. wheels, of which the driving pairs were the second pair from each end; the centres were 12 ft 2½ in. apart. The extreme working wheelbase was 19 ft 8¼ in., and the wheels were coupled in two independent sets of six, each set being powered by a pair of 17 1/3 in. × 17 1/3 in. cylinders —short stroke, once again.

The boiler was 4 ft 9$\frac{1}{16}$ in. internal diameter and contained 464 × 1 37/64 in. tubes, which were each 11 ft 5¾ in. long and had a total external surface of 2,220 sq. ft.

The firegrate was 6 ft ¾ in. long × 5 ft 10$\frac{7}{8}$ in. wide, having thus a grate area of nearly 39 sq. ft—quite large for an engine 90 years ago ! The firebox crown was 3 ft 9⅝ in. above the grate at the rear end and 4 ft 4 in. at the front end and had a heating surface of 108 sq. ft.

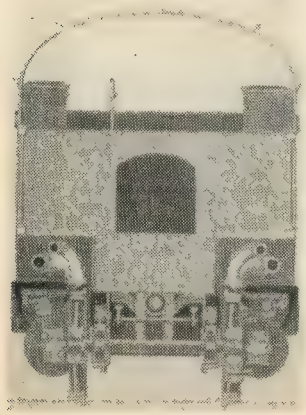
The steam dryer or superheater used was of the same design as that used on the passenger engine, but it had a larger heating area of 154 sq. ft.

With 7 tons 17½ cwt of water in her tanks and 2 tons 7 cwt of slack coal in her bunker, the total weight of one of these unorthodox locomotives was 59 tons—rather more than 10 tons on each pair of wheels.

The overall height of both types of M. Petiet's engines made it impossible to fit them with ordinary vertical chimneys of sufficient height to be of any use, so after continued experiments on the action of steam blast in both vertical and horizontal chimneys Petiet proved to his satisfaction that the direction of the upper part of a locomotive chimney made no appreciable difference to its effect on the blast, provided its diameter varied correctly in proportion to its length. He therefore boldly fitted his engines with horizontal chimneys which discharged to the rear over the cab—and thoughtfully provided an ample cab roof to protect the enginemen from the motley assortment of slack-dust, water, steam and oil which must have disgorged !

As to actual performance, on test one of Petiet's goods engines hauled a goods train of 21 loaded wagons weighing 263 tons up a 1 in 55 gradient 2½ miles in length at a speed of 10 m.p.h., while a 618-ton train was handled up a 1 in 200 grade at 12½ m.p.h. The average speed of the engine over normally-graded track was 15 m.p.h. with slack-coal consumption of 57½ lb. per mile.

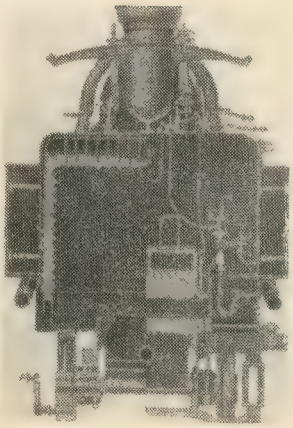
A four-coupled Petiet engine with horizontal chimney was first shown at the Exposition Internationale at Paris in 1862. ▣

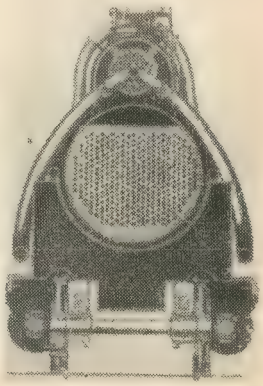


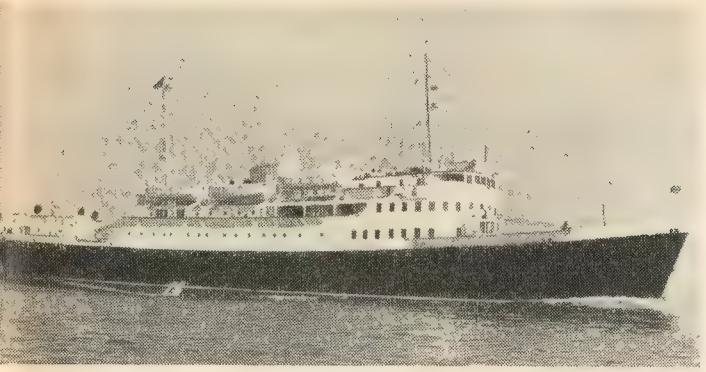
Left: *Part - section of locomotive No* 601 *behind the rear driving-wheel axle*

Centre: *Part-section of the* 610 *through the firebox*

Right: *Part-section of a goods locomotive at the second driving-wheel axle*







A WORKING MODEL OF ST NINIAN

By EDWARD BOWNESS

Now to the stem piece and stern frame in this, the third, instalment

Continued from 17 January 1957, pages 95—97

BEFORE proceeding further with the former, the stem piece and stern frame should be made. The stem piece is a piece of brass 10 s.w.g. or about $\frac{1}{8}$ in. thick, cut and shaped to the dimensions given in Fig. 9.

The stem of the former should be cut away as indicated on the drawing until the thickness of the remainder is about $\frac{1}{4}$ in. Then a slot $\frac{1}{8}$ in. wide should be cut as shown to receive the stem piece. This must be a tight fit in the slot as it must not move while the plating is in progress.

The stern frame (Fig. 8) is built up of a brass tube $\frac{1}{4}$ in. external dia. × $2\frac{1}{2}$ in. long, a forward piece of 10 s.w.g. brass, shaped as shown, and an after piece. The forward piece should be cut away at its lower after corner and a small piece 0.2 in. thick × $\frac{5}{16}$ in. wide brazed in as shown in section, *AB*.

This should be drilled $\frac{1}{8}$ in. dia. to receive the lower end of the rudder stock. The tube is hard soldered or brazed to the forward piece. It may be left longer at its lower end and filed to the correct dimensions after the hull is plated.

The after piece is formed of two thicknesses of 16 s.w.g. brass, shaped as shown, sweated together, and at their forward ends bent around the tube and on to the forward piece, both tube and forward piece having been tinned to receive them. The assembly should then be soldered together.

Three rivets may be inserted as shown as a further precaution. The former should be cut away to receive the stern frame, the ends fitting into slots as for the stem piece, and the stern tube fitting into a hole which must be drilled for it.

In the set of drawings already referred to the contour of the stem and stern is drawn the actual size for the model, to assist the builder in getting these important outlines correct.

THE PROPELLER BOSSES

Provision must be made for the propeller bosses. For these, two holes must be drilled parallel to each other and to the line of the keel at the positions shown in Fig. 3. A suitable drilling jig is shown in Fig. 10. This is made from a piece of wood 7 in. × 3 in. and approximately $\frac{3}{4}$ in. thick. An offcut from the layer boards would be suitable.

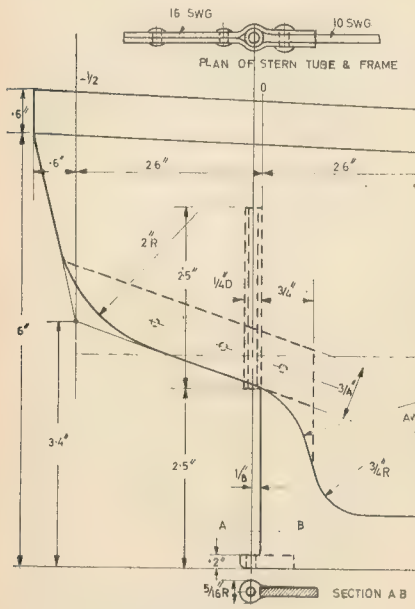


Fig. 8: The stern frame

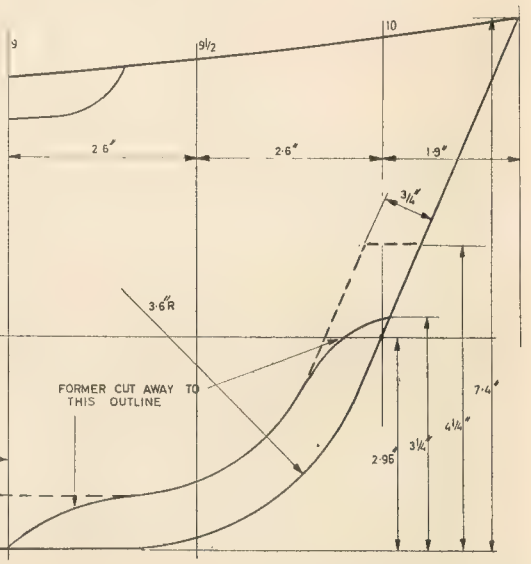


Fig. 9: The stem piece

ST NINIAN

Continued

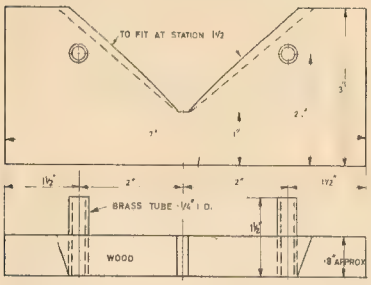


Fig. 10: Drilling jig for the propeller shaft holes in the former

The shape of the vee on the after face should be exactly as shown in Fig. 3 for station 1½. The vee is wider at its forward end, the amount of taper being taken from the former. The holes must be drilled accurately to the positions shown in Fig. 10, and they must be at right angles to the face of the jig.

Their diameter should be just large enough to receive a brass tube of ¼ in. internal dia. Two tubes ¼ in. internal dia. and about ⅜ in. external dia. × 1½ in. long should be driven tightly into the holes in the jig, so that they are flush with its after surface.

When drilling, the former should be placed in the vee of the jig with station 1½ level with its after face, and, with the bow packed up so that the keel is level, it should be held down firmly by an assistant.

The drill, which is ¼ in. dia., should be run at a high speed, especially when making contact with the sloping surface of the former. The holes should be about 4 in. deep in the former—more if possible.

PREPARATIONS FOR PLATING

Before we can commence plating the hull, the former should receive a coat of flat white paint, so that the run of the strakes of plating can be drawn on it.

The positions of the stations shown on the hull lines (Fig. 1) should be indicated and the top of the sheer strake drawn in. This is more or less in line with the surface of the shelter deck, which is the uppermost continuous deck running from end to end of the ship.

It is seen in the picture of the ship reproduced in the heading as the upper edge of the black sides of the ship, everything above it being painted white.

It is 0.6 in. below the upper edge of the former except at the bows, where, owing to the rather excessive flare, it is approximately 0.75 in. below it at station 9½, 0.7 in. below at stations 9 and 10, fading out to normal at the stern and aft of station 9. This is so that when viewed from the side this line will appear to be parallel to the deck.

From this line spaces of 1 in. should be marked off at each station, and a "fair" or smoothly curved line drawn through each series of points. Fig. 11 shows how they will look when viewed from forward and from aft, and Fig. 12 shows them in side elevation.

There will be a more or less flat area left on the bottom of the hull, and this can be made in one sheet of metal. This is virtually the keel plate.

The run of the lines of plating should be studied very carefully on the former. They should be parallel to and in harmony with the sheer line, and each line should emphasize the beautiful flowing lines of the hull. This is important as the appearance of the finished hull is decided at this stage. There are no sudden alterations in shape, and no "stealers" are required in any part of the hull.

Tinplate may be purchased in sheets 26 in. or 28 in. long by 20 in. wide. It should be 0.012 in. thick for the hull and 0.006 in. thick for the superstructure. It is possible to obtain reasonable sheets from some of the larger tins used as food containers, but for a model which, when finished, will have considerable value, it is more satisfactory to purchase new sheets.

As in the ship

The hull is built up of inner and outer strakes as in the actual ship. From the drawings, Figs. 11 and 12, it will be seen that the sheer strake (1) and the keel plate (7) are outer strakes and that the remaining strakes alternate with these, Nos 3 and 5 being outer and Nos 2, 4 and 6 inner strakes.

The overlap is 3/32 in. and should not exceed ⅛ in. at any point. The allowance for overlap is made on the inner strakes so that these must be cut 1 3/16 in. wide, whereas the outer strakes are only 1 in. The strakes should be built up in short lengths, the maximum being about 8 in., in order to simplify fitting them to the former.

The positions of the vertical joints are shown approximately in Fig. 12, the length varying from 8 in. amidships to about 7 in. toward the ends of the hull.

In plating it is advisable to commence amidships and to work towards each end. Beginning with No 2, the first inner strake, a strip of tracing paper about 10 in. × 2 in. should be laid on the former and the outline of the first plate traced through. A second line, 3/32 in. outside the first, should be drawn along each side to allow for the overlap. There is no overlap at the ends, as these are butt joints.

A butt strap is soldered at each joint on the inner side after the hull is removed from the former. The

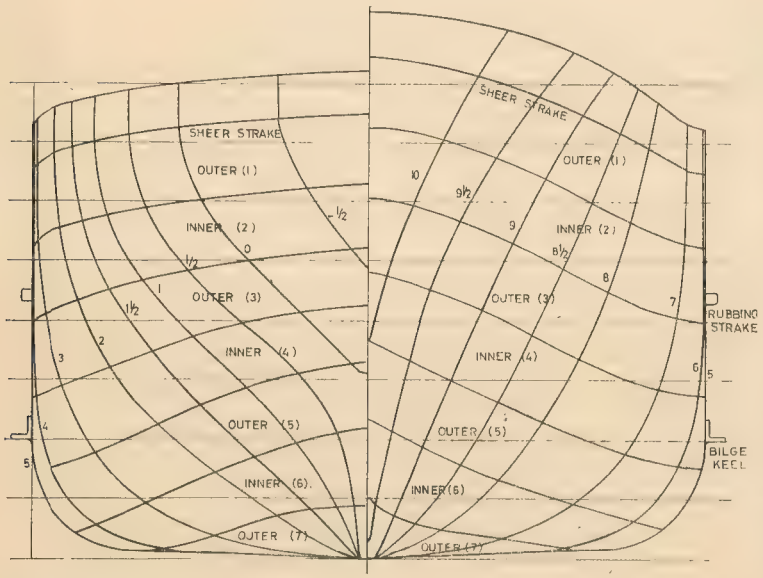
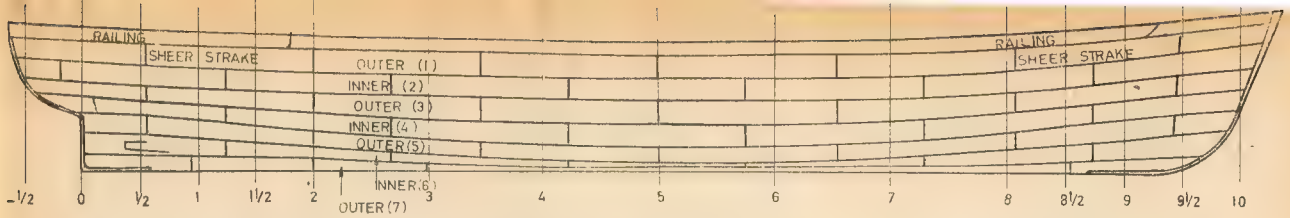


Fig. 11: Marking out strakes on the body plan



Above, Fig. 12: Side elevation of the strakes

paper tracing should be pasted on a sheet of the tinplate and the plate cut out. Remember to hold the shears at right angles to the plate so as to get a clean cut.

Remove any burrs there may be and, laying the plate on the sheet of tinplate, scribe all round it. Cut out a second plate and clean up the edges so that it is exactly the same size and shape as the first. This is for the corresponding plate on the opposite side of the hull. Repeat the process until all the plates for No 2 strake are finished for each side.

The plates towards the bow and stern will require a little fitting. At the bow the surface of the former is concave leading up to the flare, whereas at the stern it is convex. In making the tracing for the plates towards the ends it will be found rather difficult to lay the paper on the rounded surface, but the shape must be traced as accurately as possible and allowance made when cutting out the plates.

If the plate is laid on a blanket or on a wad of paper, such as a magazine, and firmly stroked in the direction of its length with a rounded knob of hardwood, such as the handle of a screwdriver, it will assume a hollow shape. There is a knack in doing this and an expert can form a plate into almost any shape. Experiments should be made with spare pieces of tin.

The plate must be formed so that it lies truly in its place on the former. If it is made a little wider than necessary it can be trimmed so that it follows the lines on the former accurately. Allowance must, of course, be made for the overlap.

A cover plate is fitted on the centre line at both bow and stern, so that the end plates of each strake can be left a little short which will, to some extent, simplify the fitting. These cover plates will be described later.

Note after-end plates

The plates for the next inner strake (No 4) should be prepared in similar manner to those for No. 2. The influence of the turn of the bilge will be met with in the three midships plates, and these must be hollowed by stroking as already described. The plates at the after end require special attention owing to the overhang of the cruiser stern, and to facilitate their fitting shorter plates are shown —see Fig. 12.

The butt joint between the last two plates is vertical, although owing to the rounding of the stern at this point it appears to be sloping in the drawing. The lower edge of the aftermost plate fits around the stern tube, and a little extra should be allowed on the width of the plate at this point. This must be cut away as may be found necessary when fitting.

The short plate above the sheer strake at the bow will require a considerable amount of manipulation owing to the compound curves of the flare, and it should be left until later by which time some experience will have been gained in fitting the other plates.

The sheer strake is very important as it is the first thing one sees on examining the model, and this also could be left until later for the same reason.

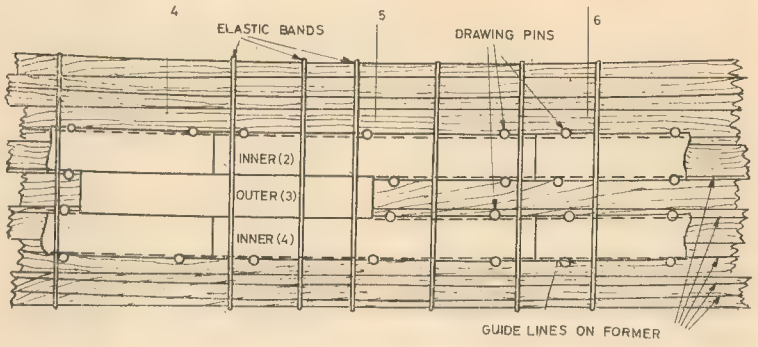
The plates for the outer strake No 3 should be made next. These should be fitted exactly to the lines on the former as they have no overlap.

We are now in a position to begin the actual plating of the hull. First fix the three central plates of strakes Nos 2 and 4 to the former in their correct positions as indicated by the lines already drawn on it. For this use small drawing pins, pressing them into the former at the edges of the plates with their heads overlapping the plates, spacing them 2 in or 3 in. apart. See Fig. 13.

As a further precaution elastic bands going right round the former would be of assistance. If ordinary elastic bands of sufficient length are unobtainable they may be made from the elastic tape used by dressmakers.

The two central plates of strake No 3 meet amidships at Station 5 and one of these should be fitted first. Remove the drawing pins where they are in the way and also push aside the elastic bands. The plates must, of course, be sweated before assembly with a film of solder wherever they meet adjacent plates. The ends where they receive the butt straps must not be overlooked.

Below, Fig. 13: The first plates prepared for soldering



In his valuable article on this subject in *Model Ships and Power Boats* [February and March, 1952] Mr F. C. Chapman made many practical suggestions, some of which I take the liberty of repeating here, especially as his experience of this process is so much greater than mine:

"To avoid a wavy or buckling effect which may sometimes occur when soldering, warm the individual plate and the part of the model which is being worked, but avoid excessive heat from the soldering iron. Therefore use an iron which gives only a little more heat than is necessary to do the work efficiently.

"Use a flux-cored solder with a 60/40 tin-lead content. This has the lowest convenient melting point for soft solder, but make sure the flux in the core is not one harmful to tin . . . the actual soldering of the plates is a series of 'quarter-inch jerks'.

"The iron is slowly passed along the strake with slight pressure and is immediately followed up by a narrow piece of wood held in the left hand and pressed down to the work to keep the two surfaces in perfect contact while the solder solidifies. In this way the piece of wood appears to be chasing the iron"

When the first half of the first plate is soldered on both edges, the elastic bands can be moved along and the remaining half soldered.

● *To be continued.*

BUILDING A NOVEL FOWLER TWO-CYLINDER COMPOUND

J. McMILLAN describes the construction of a "working" model which he made mostly from cardboard and wire

THIS ACCOUNT of the construction of a Fowler two-cylinder compound engine is based on the type that was used by Pickfords. These engines formerly belonged to Norman E. Box of Manchester.

There was a particular reason for building this model, and that was to find how small one could be made that included as much detail as possible, all strictly to scale, of course.

A scale of $\frac{3}{8}$ in. to 1 ft was decided on and drawings were scaled down from W. J. Hughes's $1\frac{1}{2}$ in. scale B.6 drawings, modified where necessary in order to model the later type engine required. A start was made in November 1955 and spread over a period of about six months' spare time: the actual building was approximately two months from start to finish.

The model was built entirely in enamelled art cardboard about 0.030 in. thick. The parts were cut out with a razor blade and treated with cellulose paint before assembly as this method tends to harden the card.

The wheels were made from the same material and treated the same way, each rear wheel comprising two rims $2\frac{3}{8}$ in. dia. with spokes attached at the perimeter but separated at the hub. The hub was built up in three parts, as described in articles dealing with $1\frac{1}{2}$ in. and other scales. The tyres are strips of card rolled round to a bore of $2\frac{3}{8}$ in. and built up to a diameter of $2\frac{5}{8}$ in. and a width of $\frac{9}{16}$ in.

One rim was cemented to this and was then held down over a marked out position on a wooden base forming a jig. The centre piece of the hub was passed over a spigot and the spoke ends cemented down.

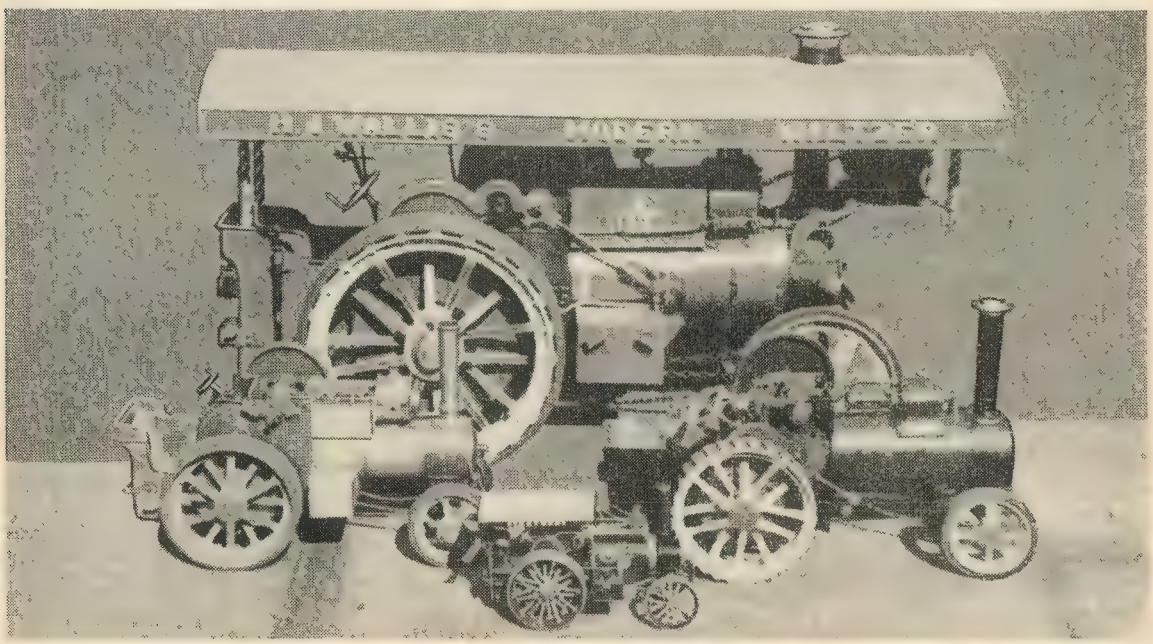
When set, the wheel was reversed, turned over in the jig and the other rim cemented into place. The outside parts of the hub were assembled last and the whole wheel given two coats of cellulose.

The front wheels were constructed in the same manner but required only one rim. The wheels were fitted to a metal axle which is steerable and pully pivoted on the perch bracket for uneven surfaces.

With the exception of the crank webs and balance weights which are made from $\frac{1}{16}$ in. card all shafts are of metal, including the crankshaft.

These were coated with a diluted solution of Loy plastic solder and allowed to set. Later they were cleaned up with glass-paper. Gear blanks were made from $\frac{1}{16}$ in. card and treated with Loy. After setting,

The model, in the foreground, compared with two free-lance traction engines and, at the back, a $1\frac{1}{2}$ in. scale Foster-type showman's engine



the teeth were "cut" with a small three-cornered file.

The motion, including pistons, rods and eccentrics, revolves quite well when turned by hand via the flywheel.

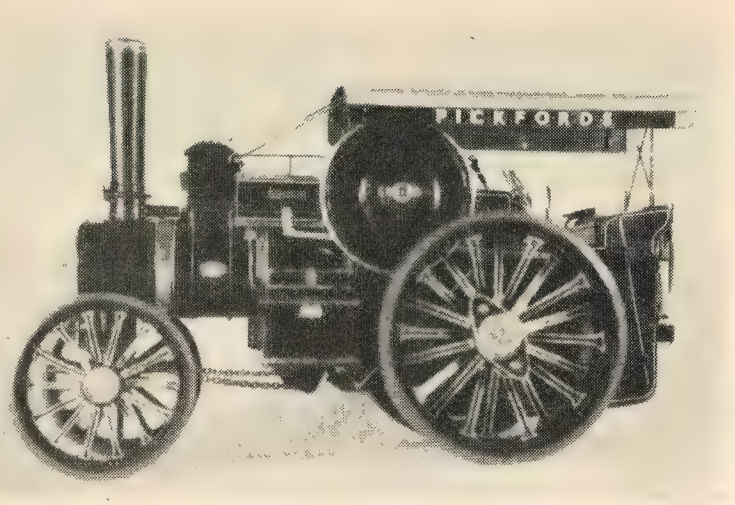
All "rivets" were reproduced where visible and were embossed on the cardboard by means of a special tool made for the purpose. This tool consisted of a piece of $\frac{1}{8}$ in. welding wire bent to form a spring hinge, similar to a safety-pin, the ends being squared off making the length of the tool about 5 in. from the hinge.

The two ends were pressed together and drilled through with a 1/32 in. drill. Into one hole was soldered a short piece of wire with one end protruding through just enough to enter the opposite hole. This end was rounded off to form the die. A guide was fitted in order to keep the two ends in alignment.

Before the card parts were assembled the rivets were marked out in their relative positions and the card was inserted between the dies of the tool, with the female die on the head side. Pressure was applied on the dies, thus forming nice imitation rivet heads.

The fittings on the model are made from brass metallic paper and include the water-gauge, which has glasses made from nylon bristle, pressure-gauge, pump, injector, water-lifter, control valves, etc.

Cylinder block fittings include piston and valve glands, regulator, starting valves, safety-valve, whistle, lubricator and drains. All pipework is actually polished copper wire of various gauges. Wheel caps are also made from metallic paper.



A side view of the model

The model is $7\frac{1}{4}$ in. long × $2\frac{7}{8}$ in. wide and is $4\frac{5}{8}$ in. from base to the top of the chimney. It is painted royal blue and lined in white.

I have fitted nameplates to the engine: in this case it is *Talisman*. The letters were embossed on metallic paper from the reverse side by means of a sharp-pointed instrument. The letters were in reverse, of course.

For comparison I have included a picture of a $1\frac{1}{2}$ in. scale Foster-type showman's engine and two free-lance engines, with the model described in the foreground.

The close-up photographs do not give the model full credit, as they were taken with an experimental portrait attachment fitted to the camera.

For those interested, the distance between subject and camera was 12 in. with camera focus set at infinity, the lighting was 450 w. arranged on either side and also 12 in. away from object. The exposure was 1/50 sec. at f.8 on Ilford H.P.3 film.

It is my intention, when time permits, to build a trailer equipped with load, such as a transformer or ship's propeller. This I think would complete the set. ▣

QUIETER UNDERGROUND TRAINS

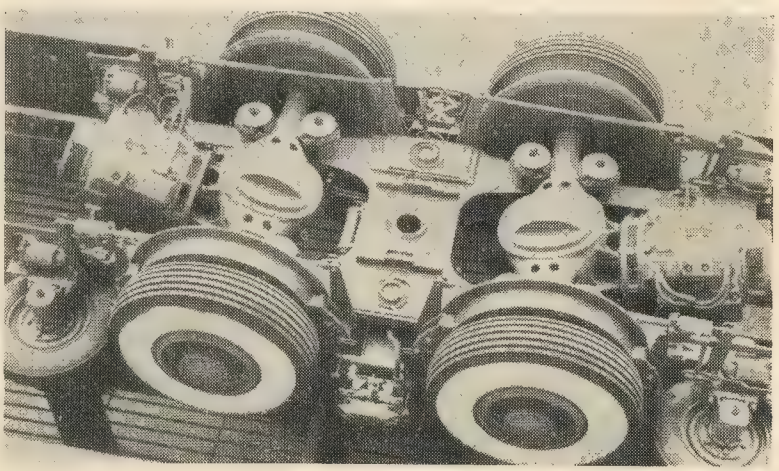
A PNEUMATIC-TYRED four-coach train is now running on the Paris Metropolitan underground system. Introduced with the idea of reducing noise and improving acceleration the train has already proved highly successful.

The rubber tyres are mounted on the outside of the standard railway wheels of the coaches and ride on a special wooden track laid on the outside of the lines. These keep the railway wheels above rail level, but at crossings and points the wooden track falls away and the train is guided and supported over the junctions by the standard railway wheels and track.

This method also guards against derailment in case of deflation. Should a tyre puncture the railway wheel alongside is lowered into contact with the rail and the train can continue without harm.

It is guided round curves by horizontal rubber-tyred wheels which press against a special guide bar that also houses the conductor rail.

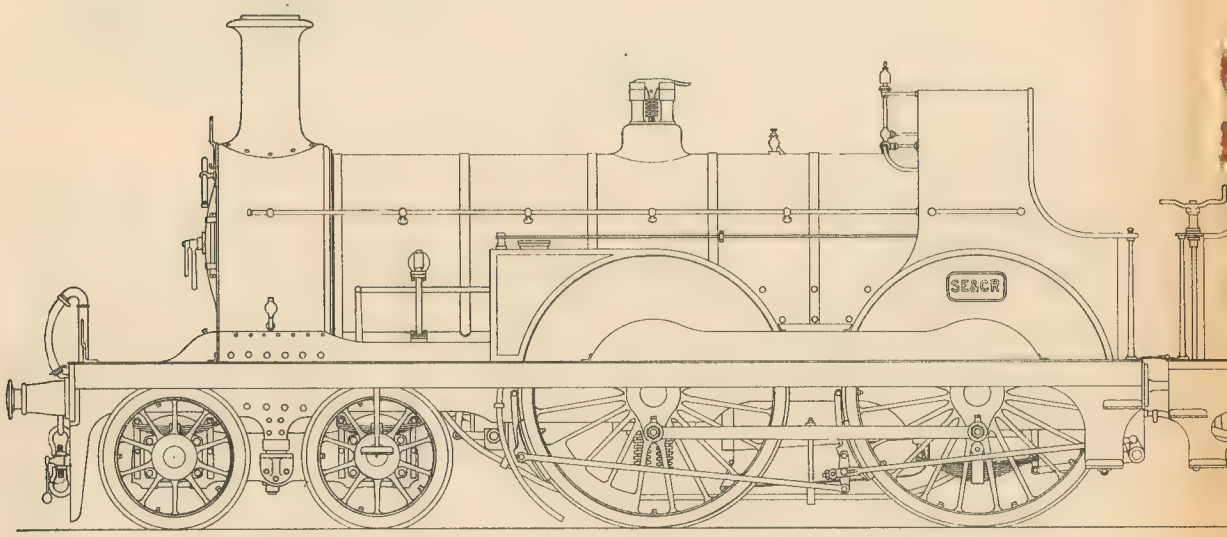
The authorities claim that the line capacity has been increased because of the sharper acceleration and deceleration of the rubber-tyred train. ▣



(Photo, courtesy of Modern Transport)

LOCOMOTIVES I HAVE KNOWN

NUMBER 26: By J. N. MASKELYNE



South Eastern and Chatham Railway Class F

DURING the railway strike in 1919 I was one of a number of volunteers who tried their hands at keeping the wheels turning on the old South Eastern and Chatham Railway.

Through my acquaintance with Mr David Sheppey, who was then the local District Locomotive Superintendent, I became "night shedmaster" (unofficial title !) at Cannon Street locomotive shed and my job, with the help of two other enthusiasts and one of the regular foremen, was to keep steam up in some 10 or a dozen locomotives that would be required to work the meagre train services next day.

All the locomotives under my charge were of either old South Eastern, or South Eastern and Chatham design; there was none from the London Chatham and Dover Railway. One of them was No 198, a J. Stirling Class F 4-4-0, still in almost her original condition, much to my delight because I had a great affection for these engines.

I have drawn her in the condition in which she was then, although I had known her for about 10 years dating from the time when she had boasted the beautiful green-and-dark-red livery and elaborate lining introduced by H. S. Wainwright in 1900.

No 198 was one of a class of 88 engines designed for the S.E.R. by James Stirling and built at Ashford Works between 1883 and 1898; for some reason that has never been very clear these attractive engines were known as "Jumbos" to the men; but for many years they were the mainstay of the S.E.R. locomotive department, and they certainly did very good work.

James Stirling was a brother of Patrick of Great Northern Railway

fame, so there were certain features that were common to the designs of both: big wheels, big cylinders, a none-too-generous boiler and the characteristic Stirling cab which seemed very scanty but actually gave quite a lot of protection from wind and the weather, as I know from my own experience with it. But that is another story.

The dimensions of this very distinctive class of engine were: cylinders, 19 in. dia. × 26 in. stroke, though the diameter was reduced to 18 in. some years later. All the wheels reflected the Stirling liking for large diameters, the four coupled wheels being no less than 7 ft, and the bogie wheels 3 ft 9¼ in. One of the main ideas of this preference for large wheels was that they revolve at less speed than smaller wheels would, and therefore the wear and tear of bearings was less.

The bogie design was unusual in that the king-pin was placed 1 in. *forward* of the centre; a lateral sliding movement of 1½ in. was provided and controlled by rubber pads in lieu of springs. The wheelbase was uncommonly short for a bogie, at 5 ft 4 in. instead of the more normal 6 ft or more.

The boiler was made in two rings arranged telescopically, the larger ring having an outside diameter of 4 ft 4 in. The pitch of the centre line was 7 ft 5 in. above rail level. True to the time-honoured practice of the Sitrlings, there was no dome; but James' ideas differed from Patrick's in that the safety-valve was mounted on the back ring of the boiler barrel instead of on the firebox. The regulator was in the smokebox and took steam from a perforated pipe mounted in the steam space in the boiler barrel.

The length of the boiler barrel was 10 ft 4½ in.; there were 202 tubes of 1⅝ in. dia., giving a heating surface of 917 sq. ft. The firebox added 103 sq. ft, to make the total heating surface 1,020 sq. ft; the grate area was 16.78 sq. ft, and the engine weight in working order was 42 tons 10 cwt, of which 28 tons 2 cwt rested on the coupled wheels.

The total wheelbase of the engine was 23 ft 9¼ in. divided into 5 ft 4 in. plus 9 ft 10¼ in. plus 8 ft 6 in. The overhang at the front was 2 ft 7¼ in. and at the back 4 ft 4 in., the total length of the frames being 30 ft 8½ in. The chimney shown in the drawing was a cast-iron one introduced by H. S. Wainwright after 1900, and its top was 13 ft 4½ in. above rail level. The original Stirling chimney was of a rather different shape but the same height.

The capacity of the tender was for 4 tons of coal and 2,650 gal. of water. The wheels were 4 ft dia. and the wheelbase 12 ft equally divided; the overhang was 4 ft 2½ in. at the leading end and 3 ft 10 in. at the back. The weight in working order was 30 tons 10 cwt.

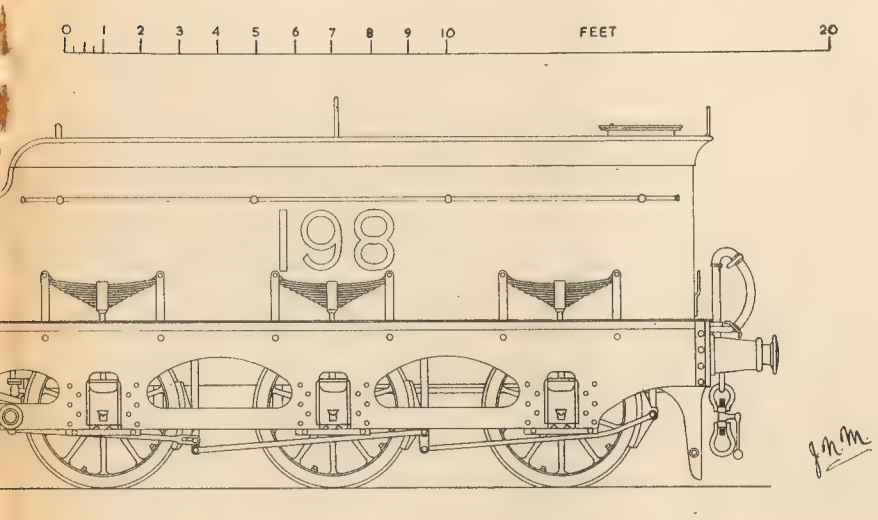
The shape of the cab, seen end-on, was important; its height was 7 ft above the running plate and its width was 6 ft. The radius of the roof was 11 ft 4 in. with a 1 ft 1½ in. radius at each side, struck from the centres of the windows, the glasses of which were 12 in. dia. The depth of the roof and sides was 3 ft.

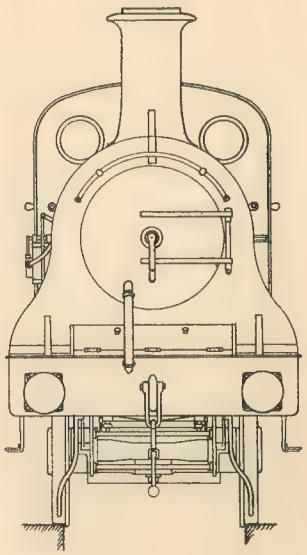
It is worth recalling that James Stirling introduced the inside-cylinder 4-4-0 type engine for the first time in Britain in a class of engine built for the Glasgow and South Western Railway in 1874. Thereafter the type was widely adopted by other British locomotive designers. In fact, it became very much a standard British type of express passenger engine for many years.

These South Eastern engines of Stirling's were a modernisation of his G. and S.W.R. engines; most of them were rebuilt with domed boilers by Wainwright, from 1902 onwards, and many of them continued to give good service until the last one was withdrawn in 1949.

My drawing represents No 198 in the severely economical wartime livery which came into use about 1915; dark grey all over, except for black smokebox and chimney, vermilion bufferbeams, white numerals and lettering. This engine was one of the few of her class that were not rebuilt.

My personal acquaintance with her was not concerned with the particular coat she wore, so to speak; I enjoyed looking after her during the nights of duty at the old Cannon Street shed, and I should not be surprised if I gave her rather more attention than my other charges received ! They were more modern and therefore less attractive to me ! ▣





VIRGINIA

L.B.S.C. gives some hints on making the first trial run, and describes the alternative cabs for the ancient and modernised versions of the American 4-4-0

Continued from 31 January 1957, pages 170 - 172

THE first thing I do when about to give a new locomotive its first trial run is to see that every moving part is lubricated.

After going around with the oil feeder fill the mechanical lubricator with a good grade of superheater cylinder oil and turn the ratchet wheel by hand until you feel a definite resistance on the forcing stroke of the pump, indicating that oil is pushing up the spring-loaded check valve and entering the steam pipe. See that the smokebox front is pushed in airtight.

To make sure that the dummy door hingestraps lie horizontally, put a 3/32 in. countersunk screw through the smokebox barrel, close to the front edge, and file a nick in the push-in part of the smokebox front to engage with it. Put enough water in the boiler to reach about three quarters up the gauge glass.

A temporary tender

If a spare tender is not available and the builder has not yet made up a flat car for riding on, a temporary tender can be rigged up with a piece of board mounted on four flanged wheels; a tin can can be used as a water tank. It should have a cock and a piece of tube soldered in it near the botom and another piece of tube near the top. Connect the former to the injector and pump feeds, and the latter to the bypass by pieces of rubber pipe. A piece of stout wire with twisted ends can be used for a temporary coupling between engine and car or ragtime tender.

Beginners should note that it needs a strong artificial draught to start the fire and keep it going until there is sufficient steam to operate the blower. There is no natural draught in a full-size locomotive unless it has an exceptionally long chimney, so there isn't much hope of any in a small one !

The easiest way to create enough draught to start the fire in *Virginia's* little firebox is to rig up an adapter, one end of which is screwed to fit on the union for connecting up the tender hand pump and the other to fit the union of an ordinary automobile tyre pump. When this is coupled up it is easy enough to pump air into the boiler with one hand while stoking up with the other. Of course, the proper thing to do is to make up an auxiliary blower, either fan or pressure-operated. But most beginners will be too impatient to see the wheels turn for the first time under steam to wait until that job is done.

Now another tip to beginners about coal. Ordinary house coal is hopeless . . . good quality steam coal should be used. Before nationalisation, when branded Welsh steam coal could be obtained, I used Graigola, Navigation, Calorite and other brands which lit freely, didn't cake, made very little ash, no clinker, and lots of steam. The last lot delivered just recently for my domestic boiler is nameless but supposed to be Grade A. It suits the boiler very well, but is no use for my little locomotives as it smokes, cakes badly, chokes the firebars with ash, and clinkers as well. Luckily I still have some good anthracite peas left !

That Pocahontas barrage !

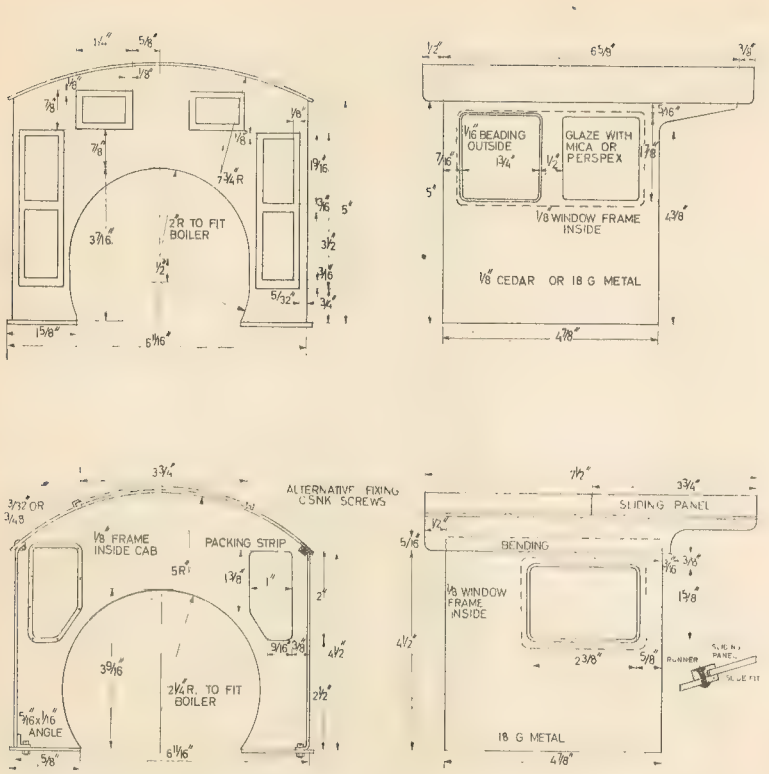
American readers who are unable to obtain good Welsh coal can use Pennsylvania anthracite, or Ford briquettes. I got excellent results from both when I was over there. I remember trying old *Ayesha* on Pocahontas steam coal. She burnt it all right—she would steam on a mixture of granite chips and tarmac ! —but put up a smoke barrage all over the landscape, and just above the top of the chimney it looked thick enough to cut with a hacksaw. I note from a recent number of *The Call Boy* that our Californian friends have been importing some Welsh coal for their little locomotives, and, indeed to goodness, I hope that they get the right quality.

To start the fire, wet some charcoal or wood chips with kerosene (paraffin) or alcohol (methylated spirit) and well cover the firebars with it. Throw in a lighted match and start pumping, with the blower-valve open. Throw in some more as soon as the first lot is well alight, then some coal can be added. This should be broken up to pea size and all the dust sifted out. Steam should be up in about three minutes, when the adapter and tyre pump can be disconnected and the boiler will do its own blowing.

When the steam gauge shows about 60 lb. " put the Johnson down in the corner," which is the old American engineer's way of saying put the lever in full forward gear, and open the throttle a little. Stand clear of the stack, for when the hot steam goes into the cold cylinders it will condense, and for the first few revolutions of the driving wheels, *Virginia* will be unladylike enough to spit out some dirty water. However, she will soon remember her manners and start to purr along with a clear exhaust, while the steam pressure will rise and the safety-valves will start to blow off. Now fill up the water can, and, if you have made the flat car, take your seat on it.

He didn't look ahead . . .

Open the throttle very steadily, for the power will amaze any uninitiated beginner. I remember once at Norbury a very talkative and super-confident overseas visitor came to see me. He was desperately anxious to see if an engine would really haul a living load on my little straight line, so I got up steam on one and invited him to drive it. He sat on the flat car facing me, not looking ahead like a good engineman should, and—yak-yakking all the time—he opened the throttle wide. The engine was blowing off, the steel rails were dry, and she gave one mighty jerk and yanked the flat car from right under him. He hadn't taken his feet right off the ground, but all the same over he went, while



Top left and right: Old-style cab front and old-style cab side. Bottom left and right: Cab front for larger boiler, modern cab side and roof, and section of runner

I made a frantic grab at the car and luckily caught it—or there would have been a spectacular buffer-stop collision at the far end of the line. It was a very quiet and crestfallen merchant who picked himself up and begged for another try, with a solemn promise to be more careful !

If your workmanship is satisfactory and the valve setting correct, the engine will move off with no apparent effort, and the exhaust beats should be quite even and very snappy without the least sign of wheezing or "syncopating." As she gathers speed pull the lever back to next notch to middle. The beats should immediately soften, but still remain even and distinct.

Now look at that engineman's nightmare, the water-gauge. The water will be near the bottom nut, so open the bypass valve until water shoots from the upper pipe (denoting that the pump is working) then close it, so that the water will go into the boiler. Leave it closed until the level rises near the top of the glass, then open the bypass a little, letting just enough go into the boiler to maintain the level.

Yet another warning to beginners: don't in any circumstances wait until the fire begins to die down before putting more coal on or you will do what our American friends call "kill her"—that is, lose all the steam. The right time to fire is when she is just going to blow off and the fire is fully incandescent. Then pop a little over the top of the fire. This will prevent her blowing off, and the process is repeated until the run is finished, when the fire can be allowed to die down. If, however, the fire is getting too big open the firehole door a little when the safety-valves lift, and wait a little before putting any more on. A little practice and experience will soon make the perfect fireman.

To operate the injector first open the water cock, and when water runs freely from the overflow pipe open the steam-valve fully. If the cones are properly made the injector will immediately "pick up" and start feeding. Should there be any dribble from the overflow when feeding adjust the water cock until it ceases.

The engine will keep going as long as the boiler is fired and supplied with water. The mechanical lubricator should be topped up every 1½ miles. When the run is finished dump the residue of the fire and the ashes by pulling out the pin and letting the grate and ashpan drop. Clean out, replace, and before putting the engine away, wipe off all oil while she is hot and fill the tallow-cups on the steam chests with cylinder oil in readiness for the next trip. This ensures that there is plenty of lubrication while the mechanical lubricator is getting under way.

If the engine fails to steam freely look for an air leak in the smokebox or a steam leak inside it, either of which will destroy the vacuum and prevent the blast taking effect on the fire. If the engine has little power and the beats are wheezy or slurred, steam is blowing past valves, pistons, or both. If the beats are uneven the valve gear requires adjusting, and the valves are not set correctly; the same applies if the engine goes better in one direction than the other.

The gentlemen who complained about this fault in Mr B-lleny's letter [Postbag, 27 December 1956] might do well to check their own workmanship before blaming the design—and speaking of design I *have* heard of very successful locomotives designed and built by other good folk who incorporated in them the principles and components described in these notes. Nuff sed !

RUNNING-BOARDS AND CAB

Making up the running-boards and cab are simple jobs needing little detailed instruction. The running-boards are similar both for the larger and smaller-boilered engines, the only difference being that the brackets supporting the running-board on the latter, are set back to meet the lesser diameter of the boiler-barrel, as shown in the end view.

The running-boards themselves are merely pieces of 16-gauge sheet steel, 17¼ in. long and 1⅝ in. wide. They are attached to the boiler by brackets bent from strips of 16-gauge steel ⅜ in. wide, riveted to the underside of the running-boards and attached to the boiler by brass screws. If the threads are tight and treated with plumbers' jointing before the screws are inserted, there should be no leakage; personally I have no hesitation in screwing both these, and handrail pillars, direct into the boiler shell, and I have no leakage trouble. However, for anyone who objects there is an alternative; the brackets could be extended downwards to the frame and screwed to that instead of the boiler.

Yet another alternative would be to make the brackets of brass, screw

and sweat them to the boiler shell and attach the running-boards to the brackets by countersunk screws nutted underneath. It does not matter which way you go, as long as you get there !

Any builder of the small-boilered engine who wants to go the whole hog and make a wooden cab should obtain a couple of large-size cigar boxes. Naturally a piece of $\frac{1}{8}$ in. cedar would be preferable, but I should imagine that the former are easier to acquire, and probably cheaper. If the size of the box doesn't allow of making the cab-front in one piece, it can be made in two pieces with the join in the middle. The sides could be joined under the cab windows.

Thoughts on wood

I know little about woodwork, but were I on the job I should cut the openings on my jigsaw; a hand fret-saw would also do the trick. The outline would be sawn with an ordinary fine-toothed saw. The butt joint, if required, would be made with Croid, or some similar glue sold in tubes, and reinforced with a small strip of thin brass at top and bottom, secured by small brass woodscrews.

The sides of the cab could be glued to the front and reinforced by pieces of thin brass angle screwed into each corner. Pieces of similar angle could be used to attach the cab to the running-board, using woodscrews to fix the angle to the cab side and ordinary screws and nuts to attach the angle to the running-board. Personally I should make the doors dummy, with the upper panels " glazed " with mica or Perspex, and the lower panels solid, and then attach them to the cab with pattern-makers' pins or gimp pins. The upper windows and those in the cab sides, could be glazed in similar fashion, the mica or Perspex being held in place by window frames made from thin brass sheet, secured by very small brass roundhead screws. A beading of half-round brass or nickel-bronze wire could be fixed around each window outside, if desired, for appearance sake.

As to the roof I understand that the usual method of " bending " wood to a curve, is to make a series of longitudinal sawcuts about halfway through the thickness on the concave side, which close up when the " bend " is made. The roof can be attached to the sides and front of the cab by pieces of thin brass angle and small roundhead woodscrews. I might mention here that the rear ends of the running-boards will be supported by the cab apron when that and the cab deck, or well, are fitted.

The modern type of cab can be made from 18- or 20-gauge sheet steel. The easiest way of making it would be to mark out the front and both sides on one sheet, leaving a strip about $\frac{5}{16}$ in. wide along the top and bottom of each side. After cutting out the openings for the boiler and the windows the sheet should be bent at right angles along the corner lines. The marked strip at the bottom edge of each side is then bent inwards at right angles to form the attachment for screwing to the running-board, and the strip at the top bent to line up with the curve of the cab roof, as shown in the drawings. If a piece of steel sufficiently large for the one-piece job is not available the cab can be made in two pieces, each comprising one side and half the front, as I described for *Ivy Hall*; or sides and front can be made separate and joined at the corners by angles and screws or Sifbronzed.

The windows are glazed in the same way as mentioned for the wooden cab, the window frames being made from thin sheet brass.

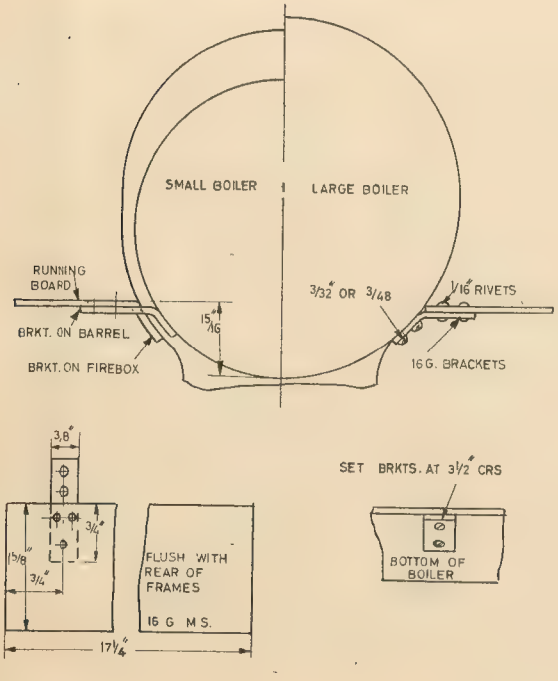
Cutting the " glass "

The mica or Perspex (ordinary glass is too thick) is cut to the size of the frame and sandwiched between the frame and the cab-side or front, the frames being riveted to the cab by bits of thin domestic pins. I use doll pins, which are less than 1/32 in. thick, and have neat little heads; one of my few friends uses 16 B.A. screws.

The roof is made from same kind of metal as the sides, and bent to the radius of the front sheet. A gap is cut in it and runner riveted to each side; a cover-plate is cut to slide between the runners and cover the gap when the engine is not at work. The complete roof is attached to the bent-in strips at each side by 3/32 in. or 3/48 roundhead screws which may be nutted inside. Alternatively, a $\frac{1}{4}$ in. strip of brass about 13-gauge can be soldered to the underside of the bent-over part and the screwholes drilled and tapped in it. This enables the screws to be put in without fiddling about with a lot of little nuts.

When erecting the single-unit cab, the steam turret and the check valve at the side of the wrapper will have to be temporarily removed, but that is only the work of a few minutes. With the *Ivy Hall* construction, each half fits without removing anything, and the two halves are joined by a butt strip riveted to one half and screwed to the other.

● *To be continued.*



Running-boards and brackets

WORKSHOP TOPICS

By MARTIN CLEEVE

A broadside for the back-room boys . . . all so terribly scientific but, please, what about a little thought for the simple things . . .

As a result of my queries in an earlier Workshop Topics on saw blades and reamers I received a very interesting letter from a reader who is employed in the tool room of a well-known motor car manufacturer.

My correspondent told me that it was a practice to precision grind the teeth of power saw blades, giving the teeth a 10 deg. clearance and only deepening the space at 45 deg. as a secondary clearance for the chips. Under production conditions, he went on, it had been found that an irregularly-sharpened saw initially cut faster, but did not last so long as one having teeth all sharpened to exactly the same height.

On the question of reamers it seems that these are not used by motor manufacturers, and the difficulties normally associated with their use are eliminated by the employment of three-lip twist drills and broaches: the latter, incidentally, being an operation beyond the model engineer except perhaps on a very small scale.

Turning once more to reamers, my correspondent thinks they would be improved if they had an odd number of cutting edges. On this point I was under the impression that some reamers were very slightly unevenly-indexed with a view to minimising chatter, but, still, whatever is done with them there seems to be room for improvement.

Countersinks

This reminds me of a little adventure I had when trying to obtain a countersink tool that would perform without chatter. Having exhausted all the possibilities offered by the local shops. I wrote to a noted manufacturer stating the requirements and the exact conditions under which the countersink bits were to operate: material, bright mild steel; speed (lowest then available) 620 r.p.m.; maximum diameter of tool, $\frac{1}{2}$ in.

By way of reply I was recommended

Fig. 1: A fabricated special-purpose milling machine. A milled and slit component is seen left

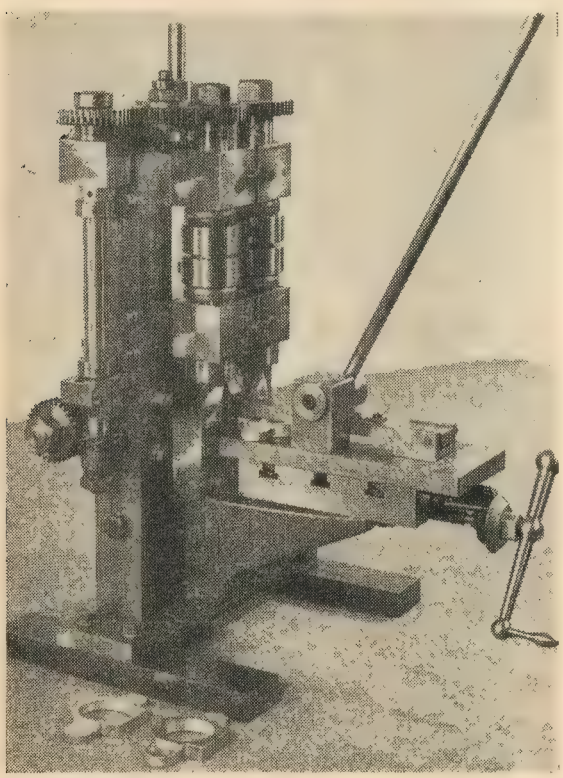
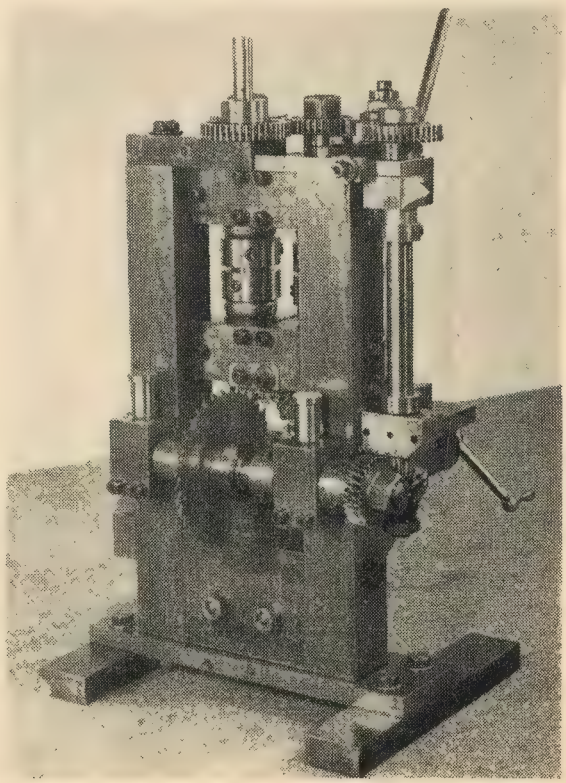


Fig. 2: A rear view of the mill showing the drive and mounting for the 4 in. slitting saw



WORKSHOP TOPICS . . .

their tool number with the intimation that that would be quite satisfactory for my needs, so although they were about 10s. 6d. each I ordered two.

After the usual delay during which the customary five per cent. increase was added to the price they duly arrived. Upon test one produced a beautiful "internal bevel gear" and could not be persuaded to do otherwise, so I drilled a series of holes of various sizes in a block of mild steel, put a "knurled countersink" in each one and shipped the lot back to the makers together with a note to the effect that they might give better results if the cutting edges were oddly indexed. In due course I received a reply stating that they found the countersink gave perfectly satisfactory results at a speed of about 70 r.p.m., and as to my remarks on oddly indexing the teeth, they had heard that "in certain cases this was beneficial in reducing the tendency to chatter," followed by regrets that they had nothing else to offer.

Now this is a situation which strikes me as being little short of astonishing. Manufacturers are always anxious to boast of their research departments wherein highly-paid white coated scientists spend their six-hour day peering into expensive microscopes, examining the contents of test tubes, trying an alloy of one per cent. more of this and half per cent. less of that —while their colleagues, in coats slightly less white, are engaged at enormous lathes machining to waste huge billets of steel in an attempt to find fresh excuses for offering yet another new grade of carbide-tipped turning tool. All this, and it is impossible to obtain a countersink to operate at a resonable speed without chatter.

Reducing noise

I have been told that chatter may be reduced or eliminated by interposing some folded rag material between the countersink and the work. I have tried this. Sometimes it worked, and sometimes it did not; anyway, I object on principle to being told to stuff my tools with rags.

Ultimately I made one with only one cutting edge projecting very slightly above the surface of a 90 deg. included angle cone, solid apart from a chip-clearance flute. It is not fully satisfactory, but despite the fact that it was made about seven years ago it is still in use and will operate at 600 r.p.m. without chatter though, as it is only carbon steel, this is a little fast for it on the larger diameters.

I often wonder why it is that there appears to be a general resentment among model engineers over the question of stating the time taken to build a model or carry out a piece of work.

If I ask the length of time spent over a project, it is not just idle curiosity or so that I can reply, "fancy that," or "you were quick." The reason for my request will be that I am attracted by the mechanism to the extent that I may wish to make a replica, but not being certain as to the time required I ask the maker with a view to forming an estimate as to how long it would take me to make.

Thus, I can compare and assess my plant facilities with those of my colleague and arrive at a figure showing whether it would be possible to fit the job between more pressing work. Of course, for this purpose the time must be stated in hours. Weeks or months are quite useless gauges, especially when your informant is likely to have spent some of the time in the exchange of idle platitudes with relatives on Sunday afternoons.

Why castings ?

Fabrication versus castings for mechanical construction appears likely to become a first-class controversial issue.

Readers of my notes will be aware that I favour the fabrication method. I have several reasons for this preference, but perhaps the first among them is that comparatively large machines can be built easily with only small or light machining facilities. Again, with the fabrication method, patterns are unnecessary and time which would have to be given to making them may therefore be devoted immediately to the task in hand.

By way of illustrating and furthering my argument I am including two views (Figs 1 and 2) showing a special-purpose milling machine which I constructed a few years ago. This was one of a set of tools made for finish machining some aluminium alloy gravity die castings, of which there were four thousand.

These castings, two of which may be seen at the foot of Fig. 1, were for the purpose of holding brush boxes for a small electric motor; the last but one operation called for milling each "ear" to form a seating for the boxes and slitting to give a clamping action for the adjustment of brush position. Fig. 3 shows what had to be done.

The two $\frac{3}{4}$ in. end-mills were so positioned that the shoulder and "ear" thickness were machined to close limits while the 4 in. dia. $\times \frac{1}{16}$ in. slitting saw was arranged easily to cut at the required point.

A Myford vertical slide was used, a quick release swing-clear eccentric clamping arrangement being mounted thereon. Due to lack of space, the whole machine was driven from the chuck of my drill press, the miller being clamped to the drill table.

The gears, with the exception of the 6 : 1 skew drive to the saw, were Myford change gears. In action the machine functioned with a floor-to-floor timing of 35 sec. per piece.

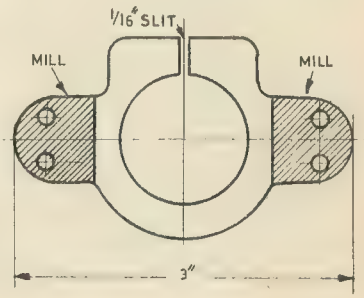
Having decided on a reasonable design for the machine, the framework was assembled in one afternoon and evening's session, the tools available being a light-duty Myford ML No 4, $3\frac{1}{2}$ in. lathe, a drill press of $\frac{1}{2}$ in. capacity and a power hacksaw. Now, apart from the fact that I have no machine of sufficient size to handle a casting of that weight and dimensions, just imagine the time needed to make a wood pattern. It would have taken me the whole afternoon to go out and get the necessary timber —that alone, incidentally, being a most distasteful job. I have yet to find a timber merchant fully able to hide his irritation over the fact that I only require a small quantity of special wood and am not placing an order for enough to floor and roof a block of flats.

In addition to this, castings do not arrive by return carriage—a week would be quite good timing. Well, the machine was working within a week.

Building this machine showed that it would not be such a very big task to fabricate quite a serviceable vertical or horizontal miller for general use. That is an idea with which I have often toyed; who has not ? As I am situated at the moment I have no space in the workshop for another machine, a circumstance which makes me reluctant to give the matter serious attention.

It has been suggested that members of the fabrication fraternity must

Fig. 3: Milling and slitting operations required on an aluminium alloy die casting



have special equipment or facilities. I am of the opinion that it is the handling of castings which necessitates the special facilities, although it has occurred to me as possible that the expression "special facilities" referred to having a stock of steel sections to hand. Of course, I have a stock of steel; at no time have I been able to see the point in having a small lathe and drill without having some stock on hand with which to feed them; that, to my mind, would be much like owning a gramophone and refusing to buy records for it.

I do not say that I bought all my stock at one big "spend up"; it has taken some 25 years to accumulate, but it has grown to a comfortable degree, the growth being helped by the fact that each time a use was found for a given section I made a point of buying a whole bar—or more of the smaller sections. Of course, it is not suggested that everyone would want to follow this procedure to the full, but to me it is necessary.

Many model engineers think up good ideas for an interesting mechanism, but not being fully sure or convinced that the idea will be worth carrying out are—quite understandably—reluctant to spend money on the materials: writing demands that I take such risks and my stock allows me to do so in the shortest time.

I think it could be safely assumed that there will always be a few readers who will say to themselves: "Good, he has knocked up that tool I thought of, and it works. Now I will make it."

Some failures!

Of course, a writer is in the happy position of not having to disclose his failures and, if he likes, can give the impression that he never has any. That is a sentiment to which I do not propose to subscribe.

Although there is little point in cataloguing them for readers' benefit, I will mention one failure, of a machining nature, which may be both comforting and entertaining.

I have some 5 in. dia. mild steel "offcuts," some of which are too "thick" to be of direct use for pulley or gear blanks. Recently I wanted a disc of that diameter, but only $\frac{3}{8}$ in. thick, so I thought it a good idea to use the lathe to part down to a diameter which could be sawn quickly.

The first point I had forgotten was that a 5 in. dia. could not be swung over the cross-slide, so an improvised holder was made to offset the parting tool which was, incidentally, $\frac{7}{8}$ in. "tall" with a cutting edge $\frac{3}{16}$ in. in width.

When I look back I think it is a wonder the lathe was not wrecked! I experienced all the troubles which beginners normally undergo in their first attempts at parting—save that the tool did not break, the section being too heavy. I had chatter, the lathe stalled although in back gear and tightly belted up and the tool dug in. So I cut the clearance to zero degrees and it dug in again. After an hour of this I had penetrated only $1\frac{1}{2}$ in.

I think the reason for the failure was that the tool was overhung, and it was difficult to prevent the holder from twisting under the cutting stresses, thus allowing the tool to dig in. Modified clamping with the load spread over the cross-slide would probably have been successful; no such troubles are experienced when parting stock of $4\frac{1}{4}$ in. dia. where it is possible to arrange for the forces on the toolpost and cross-slide to be symmetrically balanced.

The next time I required a "thin" 5 in. dia. disc, I cut it in the power saw, though, as the saw vice will not accommodate diameters greater than $4\frac{1}{2}$ in., the piece had to be drilled and tapped $\frac{1}{2}$ in. B.S.F. and mounted on a screwed spigot projecting from the end of a similarly threaded piece of $1\frac{1}{2}$ in. square stock, this being held in the saw vice.

This little incident did provide material for a photograph. On completion the cut (which, by the way, took 75 min.) had an area of 19.6 sq. in. and was only 23 thou. off square. I was so struck by the peculiar appearance of the stock that I took the picture (Fig. 4) which illustrates one sawn surface.

I think these strange geometric markings might be traced back to the rolling process which, possibly, leaves the metal with alternate layers of varying density—though I am at a loss to explain and relate with this theory the apparent uniform density of the left and lower side with its abrupt right-angular boundary. Perhaps someone with wider experience in these matters can give readers the benefit of his knowledge. ▣

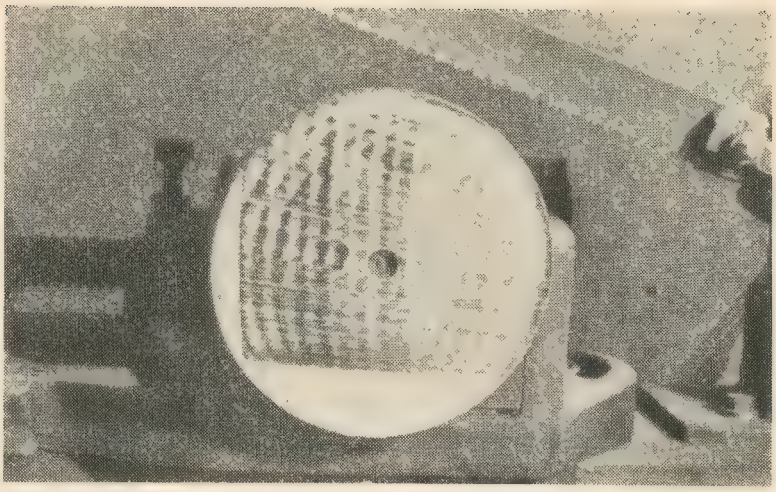


Fig. 4: Strange markings on a freshly sawn piece of 5 in. dia. bright mild stee

ON ENGINES IN BRITAIN AND FRANCE

By P. Ransome-Wallis. (London: Ian Allan Ltd). 244 pages, $5\frac{1}{2}$ in. × $8\frac{1}{2}$ in. Price 25s.

THE everyday work of the steam locomotive on all kinds of railway traffic is being studiously recorded by several observers and published in books and periodicals at frequent intervals.

One of the most expert of these recorders is Dr Ransome-Wallis, whose world-wide experiences on locomotive footplates has provided him with much entertaining material for his pen.

The book describes in detail many footplate trips in various parts of Britain and France and it makes extremely interesting reading. No attempt is made to gloss over detail; Dr Ransome-Wallis is nothing if not forthwright, and he describes everything exactly as he sees it. Indifferent locomotive work and late running are precisely recorded, together with appropriate comment, while at the same time, warm-hearted praise is given whenever it is merited.

The trips described, while interesting to the keen enthusiast, where not all successful from the operating point; time was often lost, the reasons being many and various; none of them was lost on the author, who made careful notes of all the circumstances. ▣

READERS' QUERIES

Do not forget the query coupon on the last page of this issue

This free advice service is open to all readers. Queries must be on subjects within the scope of this journal. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling, cannot be given: stamped addressed envelope and query coupon with each query. Mark envelope "Query," Model Engineer, 19-20, Noel Street, London, W.1.

Magnetising

I have two Bosch cycle dynamos that require re-magnetising; I have so far been unable to make any improvement. Can you explain how this can be done or tell me who would be able to do it for me?—H.M.P., Norley, Lancs.

▲ *The usual method of magnetising magnets for small-cycle dynamos and similar devices is by placing them between the poles of a very powerful electro-magnet. The apparatus required for this purpose would be rather expensive to make or buy, but most firms dealing with magneto repairs and servicing have the necessary equipment and would probably be able to undertake it for you.*

There will probably be a firm in your neighbourhood, but if you have any difficulty Euston Ignition Co. Ltd, 329, Euston Road, London N.W.1 may be able to assist you.

Wind-driven dynamos

I am thinking of building a d.c. dynamo powered by the wind, using a propeller. The dynamo would feed a set of accumulators when rotating, but what would stop the accumulators feeding back to the dynamo during the lulls in the wind?—D.R.A., Christchurch, Hants.

▲ *The device for preventing accumulators feeding back to the dynamo when the latter is not generating power, is known as an automatic cut-out and consists of an electro-magnetic device in the dynamo circuit which is so designed that any reversal of flow breaks the circuit. This device is used in car generators and can be obtained in voltages appropriate to cars from any motor accessory dealer.*

If, however, you are using a higher voltage than is normally used for cars, it might be possible to obtain a specially wound cut-out to suit the voltage or to rewind it yourself.

Vane gear

Could you give me some information of the working of the vane steering gear? There is a description of this in *Model Yacht Construction and Sailing* by Lt.-Col. C. E. Bowden, and it is stated that the gear is operated by a "feather" of balsa mounted on a pivot at the stern or masthead. If details have been published in the past, perhaps you may be able to refer me to this publication.—R.S.F., Rothley, Leic.

▲ *An article describing vane gear in detail can be found in* MODEL ENGINEER *of 10 January 1957. Although all vane gears work on more or less the same principle, every constructor seems to have a different idea on how they should be made—and there are innumerable variations. The example in the article is just another variation.*

Cutting a worm-wheel

Is it possible to cut a worm-wheel in the lathe with a tap with a predetermined number of teeth and diameter of blank? I have tried this method several ways, but do not appear to be able to get the right number of teeth. My equipment is a 3 in. B.G.S.C. lathe.—M.W., Sheffield.

▲ *This method is unreliable and is not recommended in cases where accuracy is necessary. In the first place the tap, when it first starts to cut and, therefore, rotate the blank, is working well outside the pitch line and is liable to produce a greater number of teeth than that for which the wheel is designed. It is also rather uncertain whether it will pick up its tracks properly to give accurately-spaced teeth.*

If a wheel is to be hobbed it should be gashed to at least half the tooth depth with a milling cutter, using indexing gear to space the teeth.

The standard form of tap is not an efficient hob, as the flutes are much too wide to ensure proper guidance and it is much better to make a special hob—if only for the purpose of finishing the teeth. Methods of cutting worm-wheels have been described in MODEL ENGINEER *in which the blank is mechanically rotated at the correct speed in relation of the tap, to cut the worm accurately. But they call for extra attachments and are only justified when a quantity of wheels are to be made.*

Sand blasting

I have recently completed repainting a bicycle and several small items covered in old paint and rust. Removing this was a long and tedious job as there were so many "nooks and crannies"—and several times during the process I wondered if I could devise some form of sand-blasting apparatus. I have a compressor which delivers 8 cu. ft per min. and will give pressures up to 100 p.s.i. Is the sand used of a special kind, and how is it introduced into the air-blast?—D.H.G., Eastry, Kent.

▲ *Articles dealing with sand-blasting apparatus have been published, but these have dealt mostly with equipment for use with small components in an enclosed chamber. Open sand blasting calls for specially constructed rooms or cubicles with dust extraction equipment and would probably be too complicated, though the compressor which you have could be adapted for this purpose and would probably be adequate in size and power.*

The sand generally used for sand blasting is a fine dry type—known as "sharp sand"—but for small components the special abrasive material used for cleaning sparking plugs is more efficient, and this can be obtained from dealers in garage servicing equipment.

An article "Making a Sand Blasting Appliance" by Duplex was published in the issues of MODEL ENGINEER *dated 26 July and 9 August, 1951.*

Bell casting

I was interested in the ship's bell described by Artificer in the Christmas edition of MODEL ENGINEER. To suit my purpose I intend to make mine 1½ times the size given, but I am having difficulty in obtaining the bell. Is it possible for you to inform me whether I can obtain a commercially-made one—or where I might obtain castings for one, as the local foundry does not mould non-ferrous castings?—B.R.A., Birmingham.

▲ *Mr W. H. Haselgrove, 1, Queensway, Petts Wood, Kent, would undertake to produce a casting from your own pattern—or he might possibly be able to quote for getting a pattern made.*

If, however, you decide to make the pattern, it should be turned to the shape of the bell with extra thickness allowed for machining, and the dimensions should allow for approximately ¼ in. per ft shrinkage. A bell casting can be produced without a core so long as the inside has a pronounced taper all the way, as it would for a bell of normal shape.

Readers' hints

This is the feature where readers exchange worthwhile ideas on workshop practice

Contributions to this feature are invited from readers. Each tip published wins a 10s. 6d. Percival Marshall book token

IT OFTEN happens, more particularly in the country, that an old or broken digging fork is to be seen stuck in a fence, or on an old iron heap.

The practical man should try to possess himself of one or two of these, for though dirty or broken and looking fit for nothing, most of them are made of fine quality steel, too good to be wasted.

I had one of these among the scrap and I found that by softening the prongs carefully a variety of small punches, chisels, square-headed screws, etc., could be made; of course, rehardening was necessary in the usual way for carbon steel.

The material is admirable for tiny chisels, because a fork, from its nature and shape, has to be made of best steel all through and not on the edge only, like some other agricultural tools.

It is probable, too, that the tines or spikes from old cultivators and harrows would be equally useful, but it is doubtful if broken tines from more modern implements would be useful in an amateur's hands as manufacturers of best-quality modern implements would use newer types of steel, requiring special heat treatment.

From one broken fork, probably eight or ten useful small tools could be got with a little skill. As the prongs of the fork taper, half the work in filing a key for a pulley is already done, for that use, of course, the metal would be left very soft.—H. D. NICHOLLS.

BELT FASTENING

A BELT fastening which is silent, quickly made, can be readily altered (for shortening, etc.), and which is surprisingly durable, consists of a lacing of gut or nylon, (fishing-line is good for small belts), in the following manner.

An even number of small holes are drilled about $\frac{1}{4}$ in. from the cut end. The belt ends are butted together and the gut is doubled; each line is passed down through extreme outside holes in one end, then up through corresponding holes in the other. They are then led diagonally inward on top of the belt to the next pair of holes, and so on, until finally the gut passes up through the two adjacent holes in the centre and the ends are tied off.

In this way, the lacing across the working face of the belt runs lengthwise over the pulleys, soon bedding itself in quite flush. Tension is even, since the diagonal lacings on top counteract each other, and there is no tendency for belt ends to get out of alignment.

Similarly the first transverse loop and the knot are on top, are away from pulley contact.—F. O. BROWNSON.

ADAPTING FILING REST

I HAVE made a filing rest as described in MODEL ENGINEER but to my own design because of the materials to hand—plenty of 3 in. × $\frac{5}{8}$ in. steel a car-axle shaft and odd bits.

I found it very useful, but one thing I did not like was the left-hand filing. Having no division plate I drilled 12 5/32 in. equal distance holes in the 4 in. three-jaw edge of the backplate and a 5/32 in. hole through my hand-toolrest top which measures $2\frac{3}{4}$ in. × $1\frac{7}{8}$ in. I then made a piece of steel tube to slide over the tailstock barrel with a four-split taper thread and milled nut, put a collar on and made the end like the lathe mandrel to fit the chucks.

If you put it on reasonably tight you can turn it by hand and peg it through the handrest in any of the 12 holes and file *right-handed*.—F. V. AIKEN.

A CUTTER FROM SCRAP

WITH the exception of 12 Allen screws my milling and facing cutter was made from scrap.

It consists of a $4\frac{1}{2}$ in. × $\frac{3}{8}$ in. disc of mild steel shrunk on to a piece of turned hex mild steel shaft. The disc itself is slotted with six $\frac{1}{8}$ in. × 1 in. slots suitably backed off and fitted with two 3 B.A. Allen screws per slot for the purpose of locking the cutters.

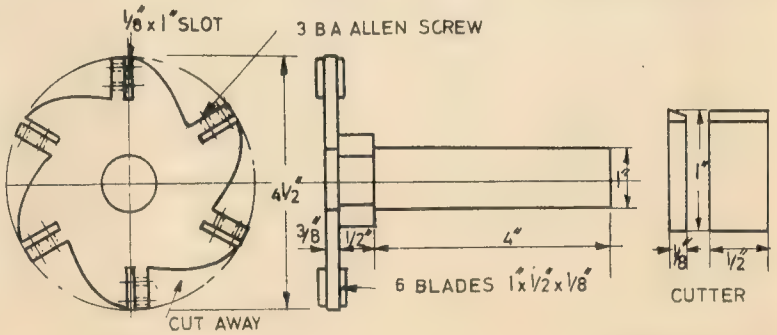
The disc was turned up from a piece of $4\frac{1}{2}$ in. steel shaft and was an offcut about $\frac{1}{2}$ in. thick, and only required boring and facing before marking out for the slots backing off. The cutters were made from an old 6 in. file which had seen its best days. This was left overnight in the kitchen fire for the purpose of annealing. Then it was cut up with a hacksaw into six pieces, filed and ground down to about $\frac{1}{8}$ in. thickness and made a tapping fit in the slots, rehardened and tempered to a light straw.

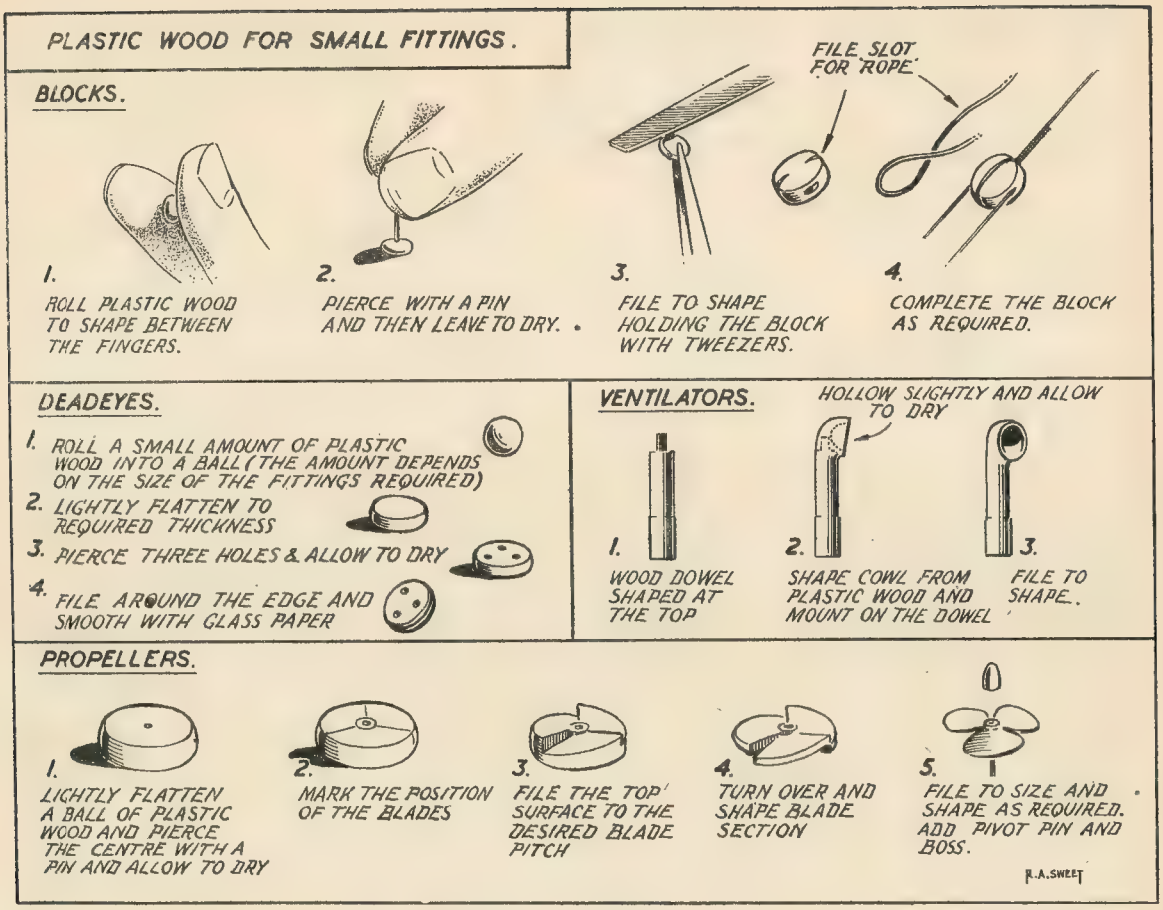
The slots in the disc were cut in the lathe, using a $\frac{1}{8}$ in. slitting saw mounted on a mandrel between centres, with the disc clamped on the toolpost, the cut away portions being milled out with the same tool at one setting and finished off with a file. Holes for the 12 Allen screws were then carefully marked out drilled and tapped 3 B.A. as shown in the drawing. Interference fit for shrinking the disc to the shaft was 0.0002.

In practice it has been found that it is quite easy to remove and replace the cutters for sharpening, and it only takes a few minutes to re-set them, utilising a face-off piece of hex. or square brass clamped in the toolpost as a gauge to ensure that all the cutting edges are equal and set square.

The finish is extremely good and the rate of cutting is equal if not superior to that of a fixed cutter, for one can ensure that the cutters are sharp which is not always possible with a fixed cutter without the use of a special grinder.—W. L. A. FEDDON.

Milling and facing cutter with detachable blades




PLASTIC WOOD FOR SMALL FITTINGS.
BLOCKS.
1.
ROLL PLASTIC WOOD TO SHAPE BETWEEN THE FINGERS.
2.
PIERCE WITH A PIN AND THEN LEAVE TO DRY.
FILE SLOT FOR ROPE
3.
FILE TO SHAPE HOLDING THE BLOCK WITH TWEEZERS.
4.
COMPLETE THE BLOCK AS REQUIRED.
DEADEYES.
1. ROLL A SMALL AMOUNT OF PLASTIC WOOD INTO A BALL (THE AMOUNT DEPENDS ON THE SIZE OF THE FITTINGS REQUIRED)
2. LIGHTLY FLATTEN TO REQUIRED THICKNESS
3. PIERCE THREE HOLES & ALLOW TO DRY
4. FILE AROUND THE EDGE AND SMOOTH WITH GLASS PAPER
VENTILATORS.
HOLLOW SLIGHTLY AND ALLOW TO DRY
1.
WOOD DOWEL SHAPED AT THE TOP
2.
SHAPE COWL FROM PLASTIC WOOD AND MOUNT ON THE DOWEL
3.
FILE TO SHAPE.
PROPELLERS.
1.
LIGHTLY FLATTEN A BALL OF PLASTIC WOOD AND PIERCE THE CENTRE WITH A PIN AND ALLOW TO DRY
2.
MARK THE POSITION OF THE BLADES
3.
FILE THE TOP SURFACE TO THE DESIRED BLADE PITCH
4.
TURN OVER AND SHAPE BLADE SECTION
5.
FILE TO SIZE AND SHAPE AS REQUIRED. ADD PIVOT PIN AND BOSS.
R.A.SWEET

MAKING FLAGS

WHILE making a U.S. flag (approximately 1 in. × 1⅝ in.) for a model of the frigate *Constitution* my main difficulty was producing properly shaped white stars in the field of blue.

The material finally adapted as best for the flag was a white, almost opaque, silk-base tissue which would not tear when wet. The method used in producing the flag was first to draw with pencil the complete flag outline—with stars and strips—on a white sheet of paper and then to fasten with tape the white sheet over a piece of fairly firm cardboard. The stars were gone over with a sharp pencil until all of the small-star area was depressed into the surface of the cardboard.

A piece of blank flag tissue was then fastened, with tape over the flag drawing. A reasonable dull (so as not to deform the tissue) red colour pencil was used to make the stripes by following the outline appearing underneath the tissue.

The star outlines were made by holding a blue colour pencil horizontally and stroking the flat of the pencil point back and forth over the blue-field area. The star area, being depressed underneath the tissue, did not pick up the blue colour.

Both red and blue colours were carried out beyond the edge of the flag. After colouring complete on one side, the tissue flag was picked up and laid, uncoloured side up, on a clean area of the white paper. The proper colours were then put on this side, using the first coloured side as a guide. The flag was then trimmed to size and glued between a thin tissue paper hem on a halliard. Finally the flag, the silk tissue being reasonably strong when wet, was draped in a wind-blown position after wetting. Upon drying, the wind-blown effect was retained by the tissue.

It appears to me that the depression method may also be of advantage when such odd-shaped objects as lions and flowers are required on a flag.—L. H. KELLEY.

MINIATURE SHIP DECKS

SOME good quality card is required (various sizes will do); coat it with button polish, allow to dry hard and afterwards rub down with flour paper.

Next, with a sharp blade using a steel rule for a guide, score for planking to scale. Mix a weak solution of water colour—Vandyke brown will be satisfactory—and wipe over quickly with a clean rag soaked in solution. This will form calking.

When calking is dry, rub down carefully with flour paper. Finally wipe over decks with methylated spirit; this gives tone and takes away shine from the polish.

The decks for my model *Port Brisbane*—awarded a bronze medal at the 1955 M.E. Exhibition—were made by this method.—JOHN T. KING.

. . . the second competition designed exclusively for the ship modeller . . . a half-guinea book voucher will go to the sender of each hint published and, in addition, a number of first-rate books will be awarded as special prizes . .

DEVICES for vices

By Duplex

THE BENCH VICE is such an important piece of workshop equipment that it deserves better treatment than is usually meted out to it; no excuse therefore is offered for the remarks on vice maintenance that appear later in these notes. But first however some hints on additional fittings that will help to make the vice more useful.

Most readers will be aware that lead clams are sometimes used to protect work held in the vice jaws; usually these clams are made from sheet lead but thicker ones are sometimes needed. Under these circumstances, the clams have to be cast and this work is carried out in the special combined ladle and mould seen in Fig. 1.

The metal is first melted in the ladle which is then tipped backwards so that the molten lead can flow into the mould itself. When sufficient metal has been run into the mould the ladle is tipped forward so that the finished clam can be removed on cooling without having to cut away superfluous lead.

For those readers who prefer to make some simple equipment to achieve the same result, the device illustrated in Fig. 2 will be found to serve admirably. The basis of this simple mould consists of a piece of 2 in. angle iron having some short lengths of $\frac{3}{8}$ in. sq. mild steel attached in order to form an angular box open at one side after the $\frac{3}{16}$ in. steel cover-plate seen in the foreground has been put in place.

To pour the vice clam, the mould is placed between the vice jaws and the vice itself is tightened to hold the cover-plate in position. After pouring, and when the lead clam has had time to cool down, the mould is removed from the vice, the cover-plate is lifted off and the clam extracted.

Clams made in this way are somewhat thick; but this is no detriment, especially when irregular components have to be held, as the soft lead readily adapts itself to the contour of the component.

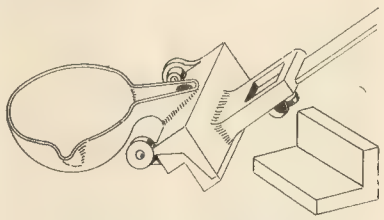
Jaws fitted to all bench vices have serrations on their faces the better to grip work placed between them. If not protected from these serrations the work naturally becomes damaged and it is for this reason that pieces of card or copper sheet are interposed between the work and the jaws.

A great improvement may be achieved if the steel jaws are removed and the serrations ground away. The grinding operation is work for a surface grinder and those readers who have good relations with the supervisory staff of a works toolroom will find they are able to get this operation carried out.

On no account should the grinding be attempted freehand; if the work is treated in this way there is every likelihood that subsequently the jaws will not meet squarely and the power to grip work evenly will be lost.

Modern vices have their steel jaws secured by hexagon-headed screws set in from the back of the jaw castings, and there is, therefore, no difficulty in withdrawing these screws and removing the steel jaws for treatment.

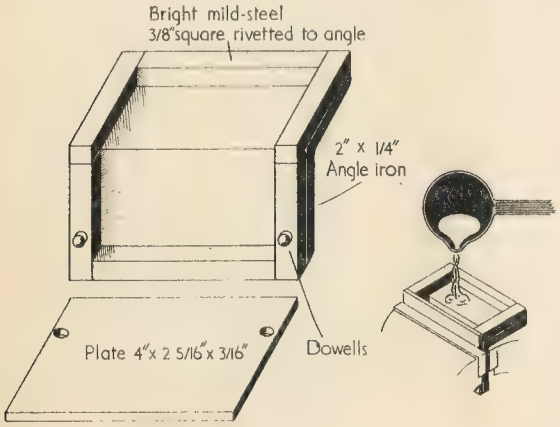
The jaws of older vices were secured by cheese-headed screws fitting into counterbored holes formed in the jaws themselves.

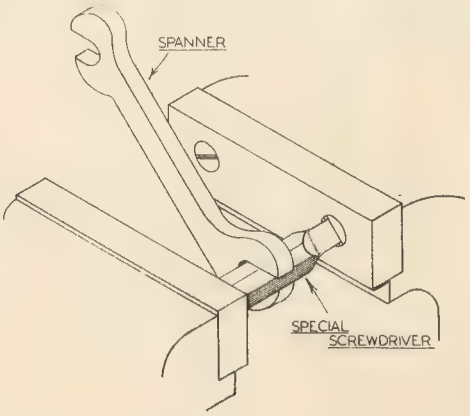


Above, Fig. 1: A combined ladle and mould for casting lead clams

Below left, Fig. 2: A simple mould for making lead clams

Below right, Fig. 3: A special screwdriver for removing the screws which secure the vice jaws





DEVICES for vices

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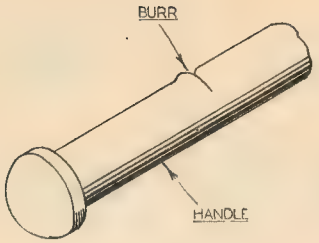
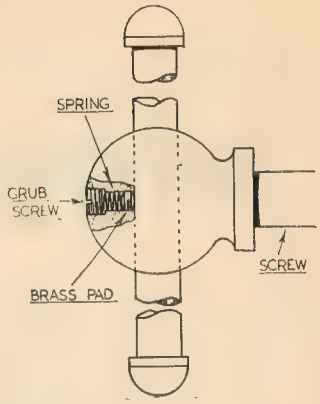


Above, Fig. 5: Providing the handle with a dirt remover



Right, Fig. 4: Modification to feedscrew to secure the handle

These screws are usually somewhat difficult to withdraw for the reason that, in the first instance, they are put in very securely by the manufacturers. In order to remove them it is best to make a short screwdriver of hexagon material and to use this tool with a spanner in the manner shown in the illustration Fig. 3.

If it can be obtained, a piece of high-tensile steel should be used to make the screwdriver. A certain amount of force will be needed to move the screws so high-tensile steel is advisable. If, however, none is obtainable, mild steel well case-hardened will probably serve.

When replacing the jaws care must be taken to see that the fixing screws do not project above the surface as they may well do after the jaws have been ground. A few light cuts over the head of the screw when mounted in the lathe chuck will take care of any difficulty in this direction.

Readers will be only too well aware of the difficulty of controlling the handle of the vice feedscrew itself, and its tendency to slide through the hole in the handle fetching up with a loud clang and, maybe, sometimes catching the user's fingers.

A small point maybe; but quite easy to rectify if the modification to the feedscrew illustrated in Fig. 4 is adopted. In order to carry out this modification, the handle itself must be removed; after which the feedscrew can be drilled and tapped to take the parts illustrated.

It sometimes happens that, because of dirt or filings, the handle tends to jam in the eye of the screw itself. If for any reason this has become a persistent trouble it can be cured by making a cut with a cold chisel so as to form a raised surface, or burr akin to a file tooth, part of the way around the circumference of the handle itself.

If the handle is now pushed up and down in the screw eye the burr will effectively clear away any dirt that has collected. For the sake of clarity this burr is shown somewhat exaggerated in Fig. 5.

For those who do not care overmuch for making their own tool equipment it may be of interest to know that the Record Company, well-known makers of vices themselves, have for many years marketed sets of red fibre vice clams.

These clams consist of a steel backplate with extension legs and a facing of red fibre to protect any work placed within the vice jaws. The red fibre facings are screwed to the backplate and so can be renewed when necessary; they will stand hard work and will last a long time before replacements are needed. The clams and their location in the vice are depicted in Fig. 6.

It is important to maintain the vice in good condition, and this virtually resolves itself to not maltreating it. The end of the sliding jaw should never be used as an anvil since there is every likelihood that repeated treatment of this character will end in the jaw breaking. If there is any heavy hammering work to be carried out on work held in the vice jaws the vice itself must be strong enough to withstand the load imposed.

Finally, care must be taken to oil the vice screw at periodic intervals; failure to do so will result in premature wear to both screw and nut. ▣

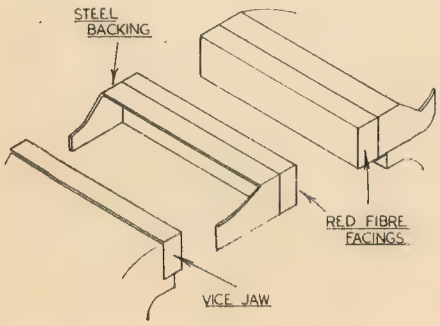


Fig. 6: Record fibre-faced vice-jaw clams

FOUNDER OF A TRADITION

Eighty Years of Shipbuilding and Designing by L. E. Richards, Crown Works, Lowestoft. Published by Richards Ironworks Ltd., Lowestoft. Price 5s.

Samuel Richards (1852-1919) was a young Cornish shipbuilder who left his native Penzance at the age of 24 to start business on his own at Lowestoft.

Commencing in 1876 he built sailing vessels until 1899 when he went in for steam. Not content with installing engines built by other firms, he started an engineering department to build his own. Following the trend of the times, the firm, which was carried on after the death of the founder by his sons, fitted diesel engines to their craft in 1926. The vessels were mainly drifters and trawlers, but during the two wars the firm built a large number of special craft for war requirements.

This is an inspiring story of enterprise and success, and with its numerous illustrations makes a book no enthusiast can afford to be without. The proceeds from its sale will go to the Lowestoft Fishermen's Widows and Orphans Fund.

POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

NOT 1917

SIR,—Your cover picture [January 10] is very nice, but surely someone has slipped up in labelling it "1917."

The 18 pdr and its R.H.A. lighter relative, the 13 pdr, were introduced into the service about 1905-06, and the 4.5 howitzer which Mr Walter so faithfully modelled about the same time.

It has always been a sad thought to me that we fought the South African war with the old 15 pdr—no shield, no recoil gear, slow rate of fire and no provision for indirect fire—two whole years after the French produced the 75 mm., 25 rounds per min. with long recoil, rock steady carriage, dial sight for indirect fire, automatic fuse setter, and a shield.

The 75 mm. had a hydro-pneumatic run out system and axle traverse which gave line accuracy up to the limit of top traverse. We adopted spring recuperators and a top carriage which gave about 4 deg. either side of zero.

As, however, the firing stresses were not in a direct line with the trail and spade, the gun tended to lose its line accuracy near the extreme limit of traverse, and about August 1916 the battlefield of the Somme was strewn with 18 pdrs out of action with broken run-out springs.

We may nevertheless have been right in not adopting the present-day system of recuperation at that time. We were a long time overcoming the difficulties of finding a satisfactory packing for hydro-pneumatic systems —I well remember my troubles with the new 6 in. howitzer on the Somme —and the first hydro-pneumatic field gun was produced in 1917, *not* the gun you show but the 18 pdr Mk IV.

This did have axle traverse, but unfortunately as it was a more powerful and heavier gun altogether than the 75 mm. the effort entailed in traversing it was excessive, as you had to move a large spade—often well embedded.

The 13 pdr, having proved useless in static warfare, was handed over to the infant A.A. service, a job for which it had no conceivable qualification except that no other gun could be spared.

I always understood that the 4.5 howitzer which Mr Walter showed this year—and very nice too—was originally designed with a barrel about 18 in. longer, but some powerful influence intervened with the result that it was shortened to lighten weight behind the team, and its maximum range cut to just over 6,000 yd.

The corollary to this is that to get any distance into enemy territory you have to plant yourself in the front row of the stalls—and any one on the other side who has nothing better to do can spend a happy half hour shelling you.

With apologies for the rather out-of-fashion military flavour of this letter.

D. J. R. RICHARDS,
North Wales. (Brigadier, late R.A.)

HUMAN CONDENSER

SIR,—Your correspondents who state that they can feel electric charges through well-insulated components are quite correct, and the explanation is simple and quite in accordance with the normal laws of electricity.

This phenomenon occurs only with a.c. current and is due to the fact that a.c. will "pass" through the most perfect insulation by capacitative action.

Taking the case of "feeling" current on the wooden casing of a radio set, part of the metal of the set is charged to mains voltage and forms one plate of a condenser; the other plate is the person touching it, and though he may be well insulated by air, wood or other material, he will nevertheless receive an electrostatic charge at 50 cycles and mains voltage.

He may not be earthed himself, but he will be standing on an insulated floor with the ground not far away; this merely means that the circuit has two condensers in series, with the person acting as the middle plate.

Extremely minute currents cannot be felt by stationary fingers, but if the hand is slid along the cabinet the 50 cycle pulsation becomes quite apparent. This is because the alternating charge varies the surface tension or "stickiness" between fingers and cabinet in accordance with the instantaneous voltage value.

I find the effect is most apparent at the bedside of a person using an electric blanket, particularly a child because of the smooth skin. If a finger be lightly drawn across the child's face or arm the pulsations can be strikingly felt. This is probably because of the large condenser plate area afforded by an electric blanket.

It should be realised that the currents involved are microscopic and create no risk to life in spite of their high voltage.

Orpington, Kent. HAYDN D. SMITH.

NOT SO PRETTY

SIR,—I was pleased to see J.N.M.'s drawing of the Dean Single [MODEL ENGINEER, January 10] but I have never understood the eulogies bestowed on the appearance of these engines by so many.

Ignoring technical considerations for a moment, the faults to my mind are: (1) the huge dome, which breaks the chimney top—cab roof line and moreover is not equidistant from chimney, safety-valve or cab-front; (2) the chimney is not in the centre of either smoke box or bogie; (3) the sloping top edge of the frames, which could so easily have been made horizontal; (4) the springs of three axles are beneath the footplate but those of the trailing axle are above it; and (5) of the four steps (on each side) no two are alike.

I think that the appearance "just happened" and no particular care was taken over it; it is a well-known fact that the first of these engines were 2-2-2s.

What is attractive is the appearance of a low centre of gravity caused, when seen from the front, by the outside framing particularly as applied to the bogie; the harmonious curves of footplate and driving wheel splasher and, if you like it, the baroque mass of blazing brass and copper.

To my mind the Dean Singles never remotely approached the early Midland Singles or the Wainwright 4-4-0s in purity of line.

Harrogate. R. E. VINNING.

SIR,—I can only endorse all that Mr Maskelyne says about the Great Western bogie singles but I venture to correct him on one technical point: the ports were 16 in. long not 14 in. The Swindon drawing shows them as 1 ft 4 in.

These cylinders were very well

POSTBAG . . .

designed, the passages being well shaped. The exhaust passages between the cylinders were separate right up to the base of the blast pipe, this being done without cramping as the double frames allowed the centres to be spread without harm to the journal bearing surface.

There is one other point that I would question. My recollection is that on these engines with the red frames and wheels, the lining was yellow not orange. The orange came in with the black wheels and underframes, but it is nearly 50 years ago and my memory may be at fault.

Bexhill-on-Sea. C. M. KEILLER.

"BOAT CHAPS"

SIR,—I see in Ship Modeller's Diary [MODEL ENGINEER January 3] that you have heard from a Mr Percival of this town, who, it would appear, is a lone wolf boat modeller.

My own interest is in model boats but most of my time is spent in the newspaper trade.

The town's M.E. Society has the odd one or two "boat chaps" among its members. I shall be most pleased to have a supporter on club nights and one never knows we might soon have a marine section within the society.

If Mr Percival would like to contact me I shall be pleased to introduce him to the Northampton M.E. Society.

25, St Leonard's Road,
Far Cotton, D. A. J. HOWARD.
Northampton.

DETAILS WANTED

SIR,—My photograph shows the barque *Seule Deern* at Lubeck at the end of the war. Perhaps one of your experts or a reader can tell me something of her history, or suggest where I might obtain a plan or sufficient details to enable me to make a model.

Southern P. H. HEMMING.
Rhodesia.

61 MILES IN STEAM

SIR,—On reading "Not far gone" [Postbag, September 15] I found the engine mentioned was only 61 miles distant and was therefore worth a visit.

This was arranged for the following Sunday and the engine inspected. It had been standing at Bankmoor quarry for the last three years but was still in reasonably good condition. After some negotiations it was purchased.

It is a Fowler Tiger 5-ton tractor No 15625 built 1920 with two-cylinder double-crank compound engine, working pressure 200 p.s.i. There was no boiler pump and only one of the two injectors remained. This proved to be the biggest obstacle of the journey home, several stops having to be made to get water into the boiler.

Many adjustments had to be made at the commencement of the journey home and it was midday by the time we were ready to start. The engine was taken steadily for the first eight miles, which got us to Tebay just before dark.

The following day a distance of 18 miles was covered with two stops for water, these being at Sow Gill and the outskirts of Sedbergh. The engine was then left at Casterton until the following Saturday when the final stage was completed.

By now the running was much improved, the final 35 miles being covered at an average speed of 8.8 m.p.h. Water and coal consumption was relatively heavy but should be much improved after overhaul.

If Mr Budge is ever in this area again I shall be pleased to show him the engine.

Skipton, Yorks. D. W. MITCHELL.

MODEL TRAMS

SIR,—May I also support R. J. Beverton of Fulham, and your latest contributor on the subject, C. B. Whitehall of Wrexham [Postbag, December 6] in their request for a series of detailed articles for a tramcar in one or two of the more popular gauges.

Steam fans and i.c. enthusiasts are well catered for (admirable and explicit instructions from L.B.S.C. and Mr Westbury respectively) but what of the tramcar enthusiast? Unlike the good folk at home, who presumably have adequate facilities for contacts with other enthusiasts we out here in Central Africa rely very much on the magazine, both for suggestions and advertisers.

Belgian Congo. G. H. COUTRET.

ELECTRICITY MYSTERIES

SIR,—The report from your correspondent, Mr H. Johnstone Pratt [Postbag, January 10] that he experiences vibrations when touching an earthed kettle indicates that he is really getting a very slight shock.

I have experienced the same effect, a tingling sensation at the finger tips if the metal of, say, a vacuum cleaner is very light touched; it is not felt if the metal is gripped firmly.

The explanation is that the very slight leakage current, when distributed over the larger surface of the hand, is insufficient to affect the nerves, but at the finger tips the current density is greater.

The cause is an ineffective earth. Many so-called earths are of high resistance and partially ineffective (see my letter Postbag 20 November 1956); earth conductors should be electrically of sufficient gauge to be of comparatively low resistance. They should be well earthed, either to a

The SEULE DEERN *at Lubeck. See "Details wanted"*

lead water main or preferably to a proper buried earth plate in moist ground.

It would be well if the effectiveness of any earth were ensured by either a direct test, using a low resistance ohmmeter test set, or by a physical inspection to see that both the flexible cord to any apparatus is not partly broken and that the wall-plug earth does really give a good earth connection.

Incidentally, the earthing of television chassis is not permissible in many makes, hence the chassis, which is generally at a high voltage, must not be touched at any cost when the set is working.

Birmingham. W. WARE.

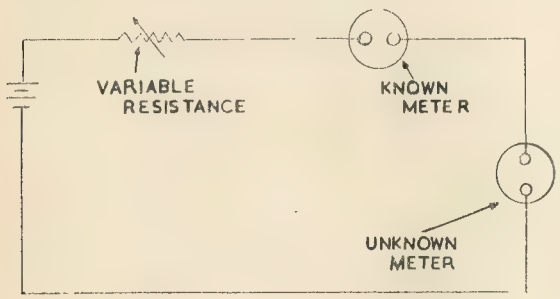
CALIBRATION

SIR,—May I draw your attention to a mistake in your reply to R.J.H. of Cambridge [Reader's Queries January 10].

You state that a m.a. meter is best calibrated by connecting it in parallel with an instrument of known calibration. This method applies to a voltmeter; but for a m.a. the two meters should be connected in series.

Both meters will then pass the same amount of current and therefore the full scale deflection of the unknown can be obtained by comparison with the known meter.

Hants. L. FROST.



Mr Frost's suggested circuit for calibrating dials of meters

GLASGOW EXHIBITION

SIR,—The model Caledonian 4-4-0 locomotive [Postbag January 10], of which H. A. Robinson requests data, was shown at the Glasgow Exhibition of 1900 not 1903, as stated by your correspondent.

At the time it was exhibited it was new and the property of Mr Douglas Croall but I cannot give the maker's name. The principal dimensions were: scale 2 in. to 1 ft, two cylinders $\frac{5}{8}$ in. × 4 in., coupled wheels 13½ in. dia., bogie and tender 7 in., copper boiler with 24 $\frac{3}{8}$ in. tubes, working pressure 120 p.s.i., height, rail to top of chimney, 26 in., length 9 ft 11 in.

Two injectors, steam sanding gear, and electric headlamp were fitted.

I trust these few items will interest your correspondent.

While upon the subject of locomotives, may I point out that the writer of "Locomotives I Have Known" has somehow fallen into sad error in December 27 issue with regard to the Worsdell engines with 7 ft 7¼ in. coupled wheels.

The statement that these were the largest in the world is incorrect. I believe Rodgers of U.S.A. built a freak 4-4-0 with 8 ft coupled wheels, but in any case at least two examples existed much nearer home.

In 1855 Gouin of Paris built for the C. de F. de Ouest a 2-4-0 with 9 ft 4 in. dia. coupled wheels. This engine, *L'Aigle*, had outside cylinders with Stephenson's gear eccentrics located upon a return crank. The boiler was similar to the Flaman and the coupled axles passed between the water drum, and the upper steam drum. This engine is mentioned by Colburn in *Locomotive Engineering* page 74.

The other French engine was of later date, being shown at the 1889 Paris Exhibition. It was built by J. Boulet and Co. This had six coupled wheels about 8 ft 4 in. dia. and was an orthodox 0-6-0 with normal locomotive-type boiler.

It was named *La Parisienne* and ran upon the C. de F. du Midi. I do not know withdrawal dates of them.

Bishop's Stortford. G. WOODCOCK.

● *At the time when they were built, N.E.R. Nos* 1869 *and* 1870 *had the largest coupled wheels about* 8 ft 4 in. dia. *and were normal engines—not freaks.* —J.N.M.

SIR,—Regarding information sought by your correspondent H. A. Robinson [Postbag, January 10] while on a visit to Rhyl in 1949 I saw this locomotive working on a pleasure ground. The owner of the locomotive informed me that it was the engine described in MODEL ENGINEER 3 June 1943 under the heading "Whence Came It."

Coventry.. T. H. ANSTEY.

● "*Whence Came It*" *stated that this locomotive was a close copy of one of J. F. McIntosh's celebrated* 4-4-0 *express engines of the Dunalastair class. It was built at St Rollox works, Glasgow, for the Caledonian Railway in* 1897. *It was made for* 11 *in. gauge.* —EDITOR.

PREJUDICES EXPORTS

SIR,—There is a tendency for motor car manufacturers to adopt the Unified or American thread. I regret this very much, in so far as the threads are concerned, although I would be in favour of having the nuts and bolt heads in even sixteenths across the flats, thus overcoming a great objection on this side of the pond to machinery of British manufacture.

With nearly 50 years' engineering experience in England and Canada, of both British and American products, I find that for all-round general use you cannot beat the B.S.F. thread.

Whitworth may have been all right in days gone by but like the U.S. National Course it has nothing by disadvantages. The S.A.E. or National Fine has gone to the other extreme; the thread itself is too weak, the slightest trace of rust or dirt makes it a tedious job to remove the nut, and the amount of metal for example on an American $\frac{3}{8}$ in. nut working surface is too small for the pressure applied.

In the case of a stud, say in a cylinder block, the Americans are forced to use the old Whitworth thread in the cast iron and then use the powerful fine thread on the outside; result, if the nut is tightened to the limit the stud snaps on the course thread.

I find the B.S.F. thread is ideal for this and in the case of rear axle U-bolts on cars, no matter how much caked mud there is the nut can be removed with little trouble, but with the S.A.E. thread, if you do succeed in starting the rusted nut the farther it comes over the dirt and rust the more difficult it is to remove.

My advice to your engineers and designers would be not to adopt the American fine thread. I think it is a backward step. If the thread angle of 60 deg. is proved to be better than the 55, this would please the United States and Canada, but in the case of nut sizes I would like to see the above suggestion of sixteenths adhered to, as whenever a Canadian is called upon to work on a British engine there is always some strong language used about non-standard nuts and bolts. This situation is used as an argument against buying British machinery, along with other prejudices and does a lot of harm to your trade with North America.

Calgary, Alberta S. T. SUNTER.

Ship modelling for beginners

What a lot there is to learn about the hobby! To help you overcome some of the initial obstacles QUAYSIDER offers his services. In his first article he deals with some of the terms you are likely to find mystifying

THE SEA has a language of its own and, on taking up ship modelling, the beginner is often puzzled by the technical terms he meets.

He wants to know the meaning of a transom stern, of a double-ended boat (yes, it is genuine, this last one !) of a hard-chine hull, of bread-and-butter construction, and so on. It is to answer these—and other—questions and to help the beginner generally, that this series of articles is being prepared. I therefore invite queries and correspondence from beginners and, incidentally, the more experienced modeller.

The simplest form of boat, and one which is to be found on all the beaches around Britain, is the open boat with rounded bilge and transom stern (Fig. 1). It is usually propelled by oars, but occasionally has a mast and a simple sail. In these days it is often fitted with an engine, either an outboard motor, a detachable unit clamped to the transom, or with an engine inboard, properly installed with shaft and propeller.

THE TRANSOM STERN

This type of boat is usually clinker built, that is, with the planks overlapping one another. This is sometimes known as clench built. The other type, in which the planks are fitted edge to edge, giving a smooth surface, is known as carvel built. Carvel building is generally adopted for better-class boats where a smoother appearance is desired, and for yachts to give less resistance and more speed. However, some of the fine-lined skiffs on the Thames and other rivers are clinker built, with mahogany or cedar planks, and look very fine.

THE DOUBLE-ENDED BOAT

The double-ended type (Fig. 2) is one in which the stern, instead of having a transom or counter, is brought to a sharp angle, similar to that at the bow. Lifeboats on both large and small ships are usually double-ended, although one or two small boats with transom sterns are often carried as service boats. The captain's gig has a transom stern in most cases.

Certain types of fishing boats—especially in Scotland—are double-ended. This was probably more true of the days of sail than of present-day types.

THE COUNTER STERN

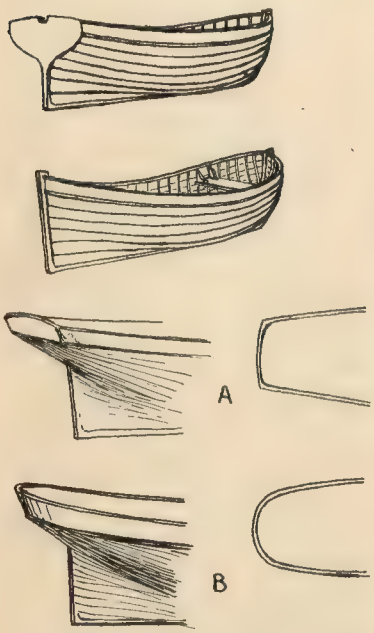
With the counter stern (Fig. 3*A* the planking is extended aft of the sternpost at or just above the waterline and terminates in a small transom which overhangs the sternpost. Alternatively its outline in plan may be rounded as shown in Fig. 3*B*, when it is known as an elliptic stern.

Yachts usually have a counter stern. This provides additional buoyancy at this point, the object of which is to enable the boat to lift to seas coming up behind, which otherwise might come aboard and swamp or " poop " the boat. Modern fishing boats are usually power driven, and the use of a propeller calls to some extent for a counter or cruiser stern.

THE CRUISER STERN

In some modern boats and in practically all modern ships, the cruiser stern has been adopted (Fig. 4). The name was taken from the naval cruisers of the early 1900s, and the sterns of many liners, especially those of some years ago, show unmistakable signs of their origin. The famous Cunarders, *Queen Mary* and *Queen Elizabeth* are classic examples of this.

In more recent times there has been



Top, Fig. 1: A boat with a transom stern; Centre, Fig. 2: A double-ended boat. Below, Fig. 3: Counters—Transom A and Elliptical B

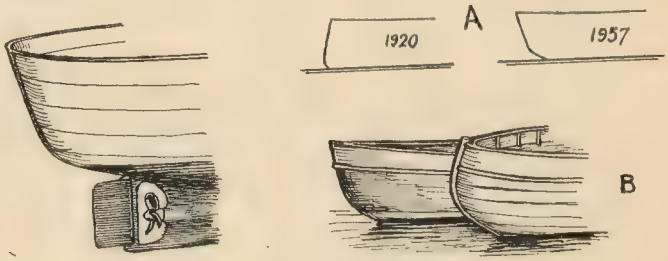


Fig. 4: A comparison of cruiser sterns

a tendency to lengthen the deck aft, so that the outline now slopes aft rather than forward (Fig. 4*A*). The new *Mauretania* displays this tendency, and *St Ninian*, the lines of which were published in MODEL ENGINEER, 3 January 1957, is a good example. In the modern motor fishing vessel (M.F.V.) the cruiser stern has somewhat of a canoe form (Fig. 4*B*) and this is found also in a number of modern yachts, especially in those built in Scandinavia.

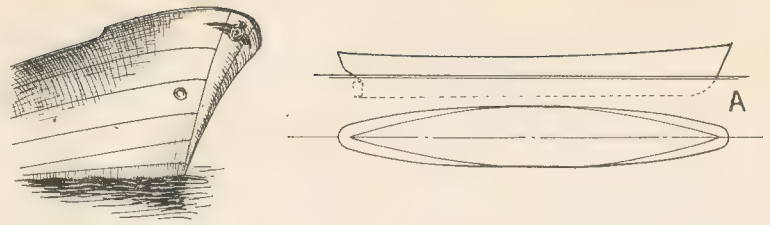


Fig. 5: A modern soft-nosed bow and double-ended outline

THE MODERN STEM AND BOW

In recent years there has been an increasing tendency to give the stem a forward rake, sometimes straight and sometimes hollowed, rather like the clipper bow of 50 to a 100 years ago. The bow badge or a modified figurehead is often seen with this feature. Most modern merchant ships have what is known as the "soft-nosed bow."

Whereas up to 20 years ago the bows terminated at a sharp angle, in the newer type the bow at deck level is rounded, as shown in Fig. 5, but still retains its sharp cut-water at the waterline. In fact the modern ship shows a strong tendency to become "double-ended," in that both deck and waterline are almost symmetrical in plan, and the outline in profile of both stem and stern slopes outwards above the waterline (Fig. 5*A*).

THE HARD-CHINE HULL

A chine is a stringer or strengthening piece running fore-and-aft along the hull of a boat, and a hard-chine hull is one in which the sides and bottom of a ship are more or less flat and meet at an angle along these chines, instead of merging into one another as with the rounded bilge (Fig. 6).

The type was originated as being easier to build than the older type of hull. For many years it was considered unseaworthy, but between the wars Scott-Paine, a naval architect interested in small boats, demonstrated its seaworthiness so effectively to the British Admiralty, that they gave it a trial. As a result they adopted the type. Since that time hundreds have been built—in fact nearly all the small-motor boats used in the Navy are of the hard-chine type.

During the last war, when the usefulness of small high-speed craft was made apparent, motor torpedo boats, air-sea rescue launches and similar craft, were all of this type.

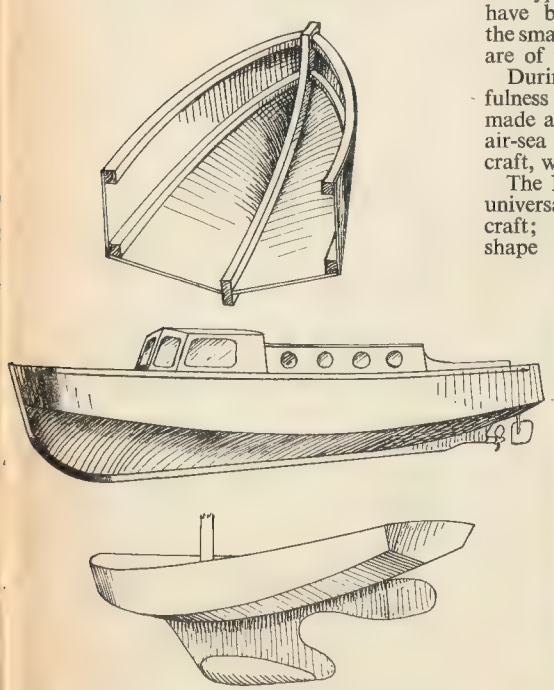
The hard-chine hull is used almost universally for motor cruises and river craft; its shallow draught, roomy shape and good stability in quiet waters make it particularly suitable for this purpose (Fig. 7). In model form it is very easy to build, as it does not call for any special woodworking skill such as is necessary in building a hull by the bread-and-butter or rib-and-plank methods. The necessary materials can be readily prepared in kit form, and a number of kits suitable for the beginner are already on the market.

THE SHARPIE OR HARD-CHINE YACHT

The hard-chine design has been adapted for both full-size and model yachts; quite a number have been built and have proved successful. The hard-chine yacht is usually known as a Sharpie.

Some years ago a south coast firm produced a kit for a 36 in. R Class Sharpie (Fig. 8) and a number of them have won honours in Model Yachting Association championship regattas. These are built on a framework of $\frac{1}{4}$ in. stringers and covered in 1 mm. three-ply, in much the same way as is used in building model aircraft.

In the book for beginners in model yacht construction, *Build Yourself a Model Yacht*, by Daniels and Tucker, the smaller of the two models described is a 30 in. Sharpie. ■



Top, Fig. 6: A section showing hard-chine hull construction. Centre, Fig. 7: Cabin cruiser with a hard-chine hull. Below, Fig. 8: A model yacht with a Sharpie hull

A high-speed naval craft with a hard-chine hull

AROUND THE TRADE

A regular feature describing tools and accessories of use in the workshop

COMB JOINTING ATTACHMENT

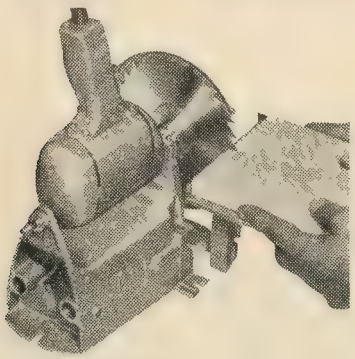
ONE of the disadvantages of making boxes and trays is the wearisome business of forming the multitude of joints necessary. The latest Bridges attachment, which can be supplied to suit any saw bench besides the manufacturer's own Toolpower drill, eliminates all the drudgery and guarantees a perfect joint each time.

The attachment costs £3 9s. 6d. and when ordering, the type of saw bench owned should be specified. It is worth mentioning that the attachment is so accurate that the joints can be made so that no glue is necessary. No marking-out is needed and once a little experience with the attachment has been acquired, joints can be made as fast as the operator can work.

SHELL CUTTING LUBRICANTS

SHELL cutting lubricants are made in four ranges, Dromus, Pella, Macron and Garia.

Of these, the first-named are soluble oils, normally used mixed with water



The latest Bridges comb jointing attachment in use

to form an emulsion, in various concentrations according to the nature of the work involved. They can be obtained in either opaque (milk-white) or transparent grades and are usually recommended for light operations, where cooling is of greater importance than actual lubrication.

They can be used for machining various metals and nearly all types of work, by diluting to the required consistency, and it is even permissible to use them in the neat state for high-pressure cutting tools such as taps and dies. Except for continuous heavy work, application by means of a brush or drip can is quite satisfactory —it is not necessary to flood the work. For wet grinding, a weak solution is suitable; for general turning, milling, drilling, etc. of free-cutting mild steel, a dilution of 1 in 10 gives good results and assists in producing a high tool finish.

Pella, Macron and Garia oils are generally used in the neat state, though they may be diluted with paraffin or other light oil. All have higher lubricating properties than soluble oils, but unless used in quantity they have a lower heat conductivity, and are less suited on this account for use with carbon steel tools which may lose their temper when heated. They are, however, better for tapping and screwcutting of most metals except cast iron.

BARDAHL OIL ADDITIVES

THE addition of 10 per cent. Bardahl to normal lubricants reduces wear on moving parts of machinery and engines by upwards of 50 per cent. Frictional losses are reduced by up to 20 per cent.

Bardahl has proved its worth as a cutting-oil additive and it was found that tools lasted longer in spite of heavier cuts. One test showed remarkable results. On a lathe making heavy cuts at a slow speed, a clearance of 7/100 mm. had to be allowed in the collar because of excessive overheating. This meant that accurate work was only possible after considerable periods had elapsed, and constant adjustments were necessary.

The addition of Bardahl, however, lowered the temperature by 24 deg. C. and enabled the clearance on the collar to be reduced to 1/100 mm. resulting in greater accuracy and a saving in time and tool life.

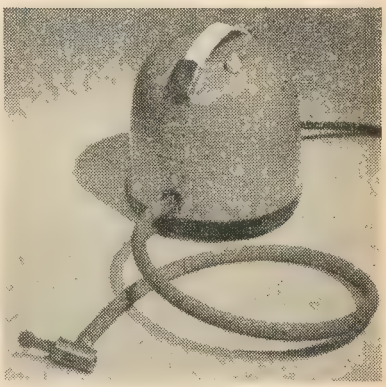
Another example is taken from an entirely different field—dental surgery. Here it was found that the flexible drives were fraying at a constant 6,000 r.p.m., whereas with Bardahl added they were able to stand continual use at speeds up to 18,000 r.p.m.

Makers are Burdahl Products Ltd.; agents: Hyder Products, Mark Road, Hemel Hempstead, Herts.

LIGHTWEIGHT COMPRESSOR

THE compressor illustrated on this page is made by Gennar Engineering Ltd, 99, Old Street, London, E.C.1 and costs £13 5s. Beside its low cost, an appealing feature is its size—6½ in. high and 6½ in. across with a weight of only 7 lb.

The compressor delivers air at more than 90 p.s.i. at a volume of ½ cu. ft a minute. It is claimed that it will inflate a car tyre from flat in 25 sec. and it is, of course, eminently suitable



The compact Gennar Mini-compressor which weighs only 7 lb.

for operating a spray gun. It will also drive models but it is not recommended that it runs for more than half an hour in these circumstances.

LATHE TOOL HOLDERS

A COMPLETE range of tool holders in sizes to suit lathes from about 3 in. to 6 in. centre height has recently been introduced by Denford Small Tools (Brighouse) Ltd, Brighouse, Yorks.

These holders are of the American type to accommodate high-speed tool bits of square section, and are suited particularly for use in lantern type tool posts, though also capable of use in other types. They are produced from drop forgings in nickel chrome steel, case hardened and finished in dull cadmium plating. A special feature of their production is that the tool bit seatings are accurately broached out so that the bit bears evenly throughout the length of the slot and no bending stress is imposed by the clamping screw.

The latter is of high-tensile steel, with square head, and a box key to fit this is provided with each tool together with one 18 per cent. tungsten steel cutter. Sizes range from OO, for $\frac{3}{16}$ in. dia. bits, to 4, for ½ in. dia. bits, in straight, right-hand and left-hand shapes.

A ship modeller's diary

By JASON

"WHAT's my next ship model to be?" This question is evergreen and it is a serious question requiring much thought. There are some who are committed to a series policy. For example, a chap might decide on the ships of one company but usually, especially with beginners, many things have to be considered.

The scale, although important, is not the most important. Information available and research work, which might be necessary, sometimes frighten beginners. Yet a few months on research will not only save headaches but will be extremely interesting too.

I am reminded of this by a reader from Dymchurch, Kent, who admits to one or two poor ship models in the past. Now he is determined to tackle a serious showcase steamer of the latter half of the 19th century. He is toying with the idea of the P.S. *Glen Gower*, but in any case it will be a steamer after 1850.

Well Mr Townsend, I admire your choice of subject. The liners still carried masts and sails. They had fiddle bows and turtle backs and only a very few decks. Incidentally this is the period of fancy anchors galore of which the Trotman anchor is but one example. All of these anchors may be found in the Patent Office Records chronologically listed but not mentioned with a specific ship.

Christmas cards and ships

THE foregoing prompted me to look over my Christmas cards this year and my eye was caught instantly by a smart Western Ocean packet. The coloured picture is a reproduction of a contemporary painting of 1852 showing a close-on-the-starboard quarter view of the ship reducing sail just abreast of the Rock Lighthouse at the entrance to the Mersey. Here are single topsails and studding sail booms with enough main pole for a royal yard.

These vessels were the Queen Marys of their time. Remember Charles Dickens went to America in steam but he came back in sail *and luxury*. The Cunard Line had been going a dozen years by then but it was still unable to get the cream of trans-ocean travellers. Although the painting may be by one of the Walters I am unable to establish this.

One interesting feature is the convention of the artist in depicting in the background several other views of the same vessel. Also to be seen in the picture is a weaver flat which is now as dead as the dodo but which was once a feature of any north western estuary. This reminds me that no one within my knowledge has yet attempted a model of the Western Ocean packet in this country; say from the period 1830-1855. Those in the National Maritime Museum were from U.S.A.

* * *

One of the most interesting to me was "The Irish Packet Entering the Mersey 1831" (by Samuel Walters). Steam had not been in use for more that a score of years. Yet here is a sturdy single-deck paddle-wheel steamer. The paddle wheels as such, were to last for a century or more. The cross-Channel trade, as any deep-water sailorman will tell you, can be as bad as any encountered on any of the Seven Seas.

The *Irish Packet* carries fore and aft sails but they were furled. She has a single flush deck but no sign of the tiny bridge between the paddle boxes. The man at the wheel by the after end of the poop can be seen clearly, as can the officer in charge nearby. Some passengers are about the decks.

It must be remembered that the cross-Channel packets were the smartest of all trades. They attracted the best brains and the best men. Yet I know very few ship modellers who bother their heads about them when seeking a new subject.

Do you remember the model of the paddle steamer *Sirius* in the recent Model Engineer Exhibition? She was about the same time as the *Irish Packet* and not much bigger. She belonged to Hull and I feel proud to have had the care of the *Sirius*' figurehead of a large black shaggy dog, the size of a large settee, at the Liverpool Shipping Week Exhibition (1931). This figurehead is still in the Hull Museum.

The model of the *Sirius* was excellent in every way. Why are not more of these prototypes modelled for this and succeeding generations to see? The Isle of Man Steam Packet Company has had more than several score steamers in its century and a quarter of service, each one of which in its day was one of the fastest and smartest of cross-Channel steamers.

Model a Christmas card

TWO of my cards consisted of a photograph of a model. One was Watkins' tug *The Anglia*, by Arthur Pollard, the able secretary at the Gravesend society. This *Anglia* was famous as the vessel which towed Cleopatra's Needle from Egypt to the Thames. She had three funnels, the after two of which were abreast. A paddler, she was built in 1866 and lasted until 1894. He owners claim the privilege of being the first steam towing company on the Thames and they still have the largest fleet operating.

The other card is from my old friend Freeston, the Wembley chairman. His card shows his model whaling scene which was so much admired at this year's exhibition. The photograph is crisp and clear and shows every detail of the whale boat and the sounding whale.

* * *

Two cards which offer a subject for the Maze Challenge Cup (pre-1820) are of 18th century ships. "An Indiaman Lying-to," by Charles Brooking (1723-1759), is unusual because it shows the lateen yard with no sail in front of the mizzen mast. Very soon the lateen boom in front of the mast was cut off hence the modern spanker. The other one is a "Dutch Frigate at Anchor."

* * *

This year I have a card showing a Humber Keel with mainsail and topsail set. She is close to Beverley on her way to Driffield way up in Yorkshire. I wonder why the card says that the keel is in direct descent from the Viking longship? Can it be because the mast is amidships? But so are the Grecian, Assyrian and Roman ships a thousand or two years before. I see no other likeness.

Still this is a question for the Sheffield Ship Model Society—and perhaps also Birmingham. They are interested in trows which have a similar rig. But somehow the best of the cards showed homely scenes of the pool—modern, very modern, and the Houses of Parliament with a cluster (is this the right word?) of barges in the foreground, not forgetting the inevitable police boat.

* * *

Those who sent postcards about forming new societies may expect some action within the next few weeks, which also means it is not too late for others to send postcards. ▣

★ ★ ★ CLUB NEWS ★ ★ ★

Edited by THE CLUBMAN

ALTHOUGH lack of petrol is putting a large "if" into programmes for the coming months, most clubs are making their normal arrangements and leaving the rest to fate and Baron Mills.

Poole Model Yacht and Power Boat Club, for instance, has decided to run its annual radio-controlled regatta on Poole Park Lake at the Whitsun weekend—the Saturday and Sunday, June 8 and 9. "We are aware," writes Commodore R. P. Simpson, "that if petrol rationing is still in force on that date it may be difficult for competitors to make the journey to Poole. The club feel it necessary that continuity should be maintained, and if competitors have ample warning of the date they will be enthusiastic enough to organise their petrol ration, and somehow manage."

"The programme," continues Commodore Simpson, "has already been planned. With some slight alteration to details which we think is necessary to keep up with modern radio-control development, the main programme is substantially the same as last year. The policy of the club has always been to put on events for all kinds of radio-control craft. There are events which the young beginner can happily take part in, and we have events which are kept in to tax and stimulate the old hand to better and more intricate control."

Explaining why the club does not wish to alter the character of the programme from year to year, the commodore says that the competitors know the standard that they must achieve to gain an award and if they fail "they invariably go away with the knowledge why they failed and the determination to overcome that failure, and compete again in the same event next year."

PATIENCE REWARDED

Still further west, **Exeter and District M.E.S.** has ended another successful year.

One of the society's achievements during a busy 12 months was the completion of the O-gauge railway so far as it was planned. Its performance at the exhibition in August-September, when record numbers attended, was "completely satisfactory," says H. Godfree Angel, of Longdown, Exeter, the society's excellent publicity officer.

"Various additions to this layout," he continues, "have since been decided on and some of them are already in hand. Several other developments, involving other sections of the society, are being arranged, these having been held over during the concentration of most of our resources on the construction of the O-gauge layout. Other interests in the society can therefore look forward to something in their own sphere, as a reward for their waiting, and made possible because of it."

MODELS AT THE PARTY

Christmas already seems a long way back but there are some children in the Hoddesdon area who still talk of the great time which they had at the Esdale Hall when **Hoddesdon and District Model Railway Society** held its annual Christmas party for the second year.

Bad weather conspired with petrol difficulties to keep many people away, but those who were there enjoyed themselves enormously. After the opening by president J. Newport about 35 children tucked into tea, with party games and competitions to follow.

On exhibition were models and samples of trackwork made by members. The junior section, which had a display of its own, offered some fine models made with materials readily obtainable in the home. Terry Dell's scenic effect won first prize, and a model of a country station gained the second for Derek Anstey. All boys who entered for the competition received awards from the president.

In the course of the party, regret was expressed at the departure from the district of Peter Fieldhouse, who had been succeeded as secretary by W. H. Dell (106, Ware Road, Hoddesdon, telephone 3982). Mr Dell was handed an engraved table lighter and pipe for "onward transmission" to Mr Fieldhouse in appreciation of his work for the society.

The president said that while he was not an active member he had always had a strong interest in model railways and was pleased at the growth of the Hoddesdon Society and its shows during the past year. This success could be attributed mainly to the untiring efforts of Mr Fieldhouse.

As a serving R.A.F. officer, Mr Fieldhouse was posted to a distant part of the country at very short notice just before Christmas. Readers will wish him well.

M.E. DIARY

February 7.—Eltham and District L.S. "Boiler Brazing," chairman A. L. Hutton. Hitchin and District M.E.C. films. Institutions of Electrical, Mechanical and Civil Engineers, joint London meeting for Third Graham Clark Lecture, Prof. Sir Ifor Evans.

February 8.—J.I.E. Pepys House, "Kinematic Design," R. J. Herbert, 7 p.m. Institution of Mechanical Engineers, "Economics of Plant Replacements and Renewals," C. W. Griffiths, headquarters 6 p.m. Welling and District M. and E.E.S. "Bits and Pieces," 8 p.m. (All members requested to bring something.)

February 11.—J.I.E. Sheffield, "Power Station Construction," S. S. Ellam, 7.30 p.m. Clyde S. and M.M.S. nautical quiz, Hugh Launder and William Forth (illustrated) Kelvingrove Museum, 7.30 p.m.

February 12.—Bristol Ship Model Club, "Mediaeval Ships," N. H. Poole, Legion House, Portland Square, 7 p.m. Institution of Mechanical Engineers, Automobile Division general meeting, papers, headquarters 6 p.m.

February 13.—Birmingham S.M.E. film show, King's Arms. Harrow and Wembley S.M.E. illustrated lecture, "Deep Sea Fishing."

February 16.—S.M.E.E. Annual meeting, Pepys House, 14 Rochester Row, Victoria, S.W.1, 2.30 p.m.

INDEX FOR VOLUME 115

The index for Volume 115 of MODEL ENGINEER is now ready. It may be obtained from the Sales Department, Percival Marshall & Co. Ltd, 19-20, Noel Street, London, W.1, price 1s. post free. It includes a title page and it will be sent out in an envelope with cardboard stiffener. Overseas readers should send an International Money Order for 1s. Please do not send stamps.

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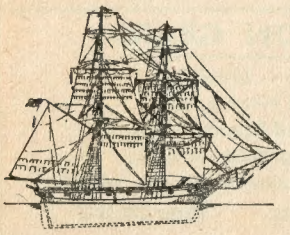

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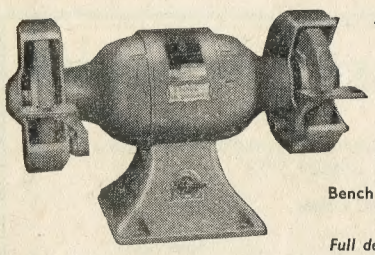

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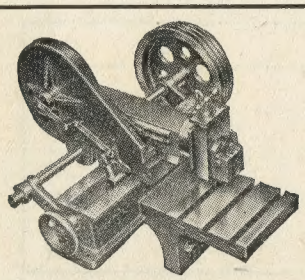

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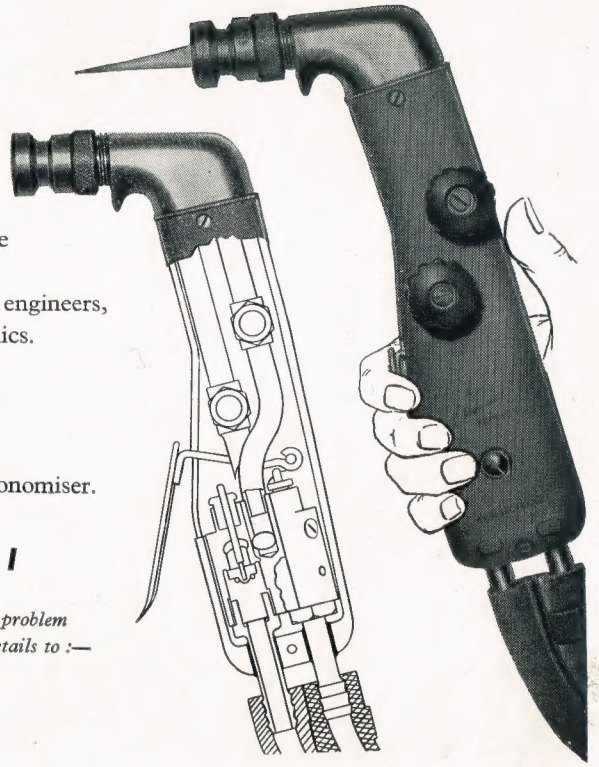

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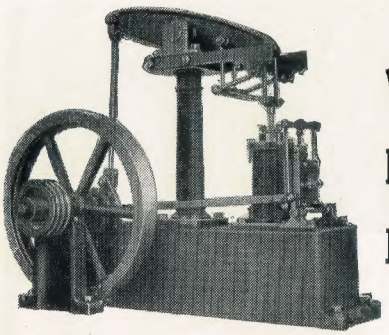

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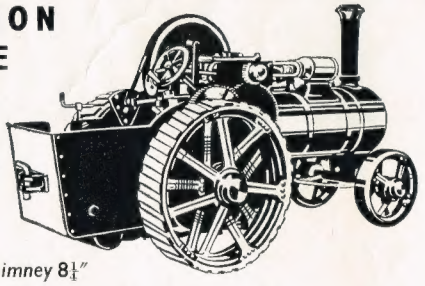

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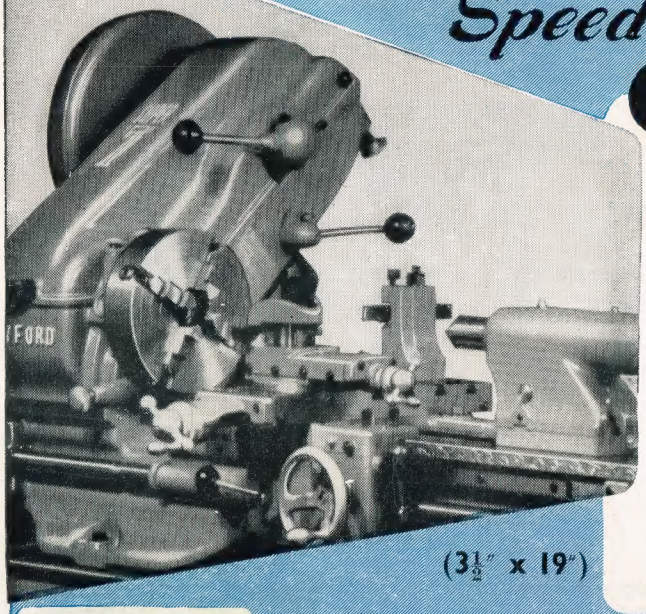

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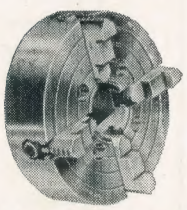

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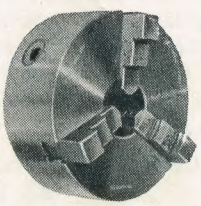

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